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Junos® OS

Channelized Interfaces Feature Guide for Routing Devices

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Table of Contents

About the Documentation xxi
Documentation and Release Notes xxi
Supported Platforms xxi
Using the Examples in This Manual xxi
Merging a Full Example xxii
Merging a Snippet xxii
Documentation Conventions xxiii
Documentation Feedback xxv
Requesting Technical Support xxv
Self-Help Online Tools and Resources xxv
Opening a Case with JTAC xxvi

Part 1 Overview

Chapter 1 **Channelized Interfaces Overview 3**

Channelized Interfaces Overview 3
Channelized Interface Capabilities 4
Data-Link Connection Identifiers on Channelized Interfaces 6
Clock Sources on Channelized Interfaces 8
Channel Scaling Numbers of Channelized SONET/SDH OC3/STM1 (Multi-Rate) MICs with SFP 12
Channel Scaling Numbers of DS3/E3 MIC 13
Channelized E1 and T1 PIM Properties 14
Channelized IQ and IQE Interfaces Properties 14
Structure of Channelized IQ and Channelized IQE PICs 16

Part 2 Configuring Channelized Interfaces

Chapter 2 **Configuring Channelized E1 Interfaces 29**

Channelized E1 IQ and IQE Interfaces Overview 29
Configuring Channelized E1 Interfaces 29
Configuring Channelized E1 Interface Properties 31
Example: Configuring Channelized E1 Interfaces 32
Configuring Channelized E1 IQ and IQE Interfaces 33
Configuring E1 IQ and IQE Interfaces 33
Configuring Fractional E1 IQ and IQE Interfaces 33
Example: Configuring Fractional E1 IQ and IQE Interfaces 34
Configuring NxDS0 IQ and IQE Interfaces 34
Example: Configuring an NxDS0 IQ or IQE Interface 34
Example: Configuring Channelized E1 IQ or IQE Interfaces 34

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Chapter 3 Configuring Channelized IQ Interfaces 37

Overview of Channelized IQ Interfaces 38
Guidelines for Configuring Channelized IQ Interfaces 39
Frame Relay DLCI Limitations for Channelized IQ Interfaces 42
System Requirements for Channelized IQ Interfaces 44
Terms and Acronyms for Channelized IQ Interfaces 45
Roadmap for Configuring Channelized IQ Interfaces 45
Configuring a Clear Channel on a Channelized IQ Interface 45
Configuring Single-Level Channels on a Channelized IQ Interface 46
Configuring Multilevel Channels on a Channelized IQ Interface 47
Configuring a Class-of-Service Scheduler Map on a Channelized IQ Interface . . 48
Associating the Scheduler with a DLCI on a Channelized IQ Interface 49
Scheduler Limitations for Channelized IQ Interfaces 49
Verifying Class-of-Service Schedulers on Channelized IQ Interfaces 50
Roadmap for Channelized IQ Interface Configuration Examples 51
Merging Examples 51
Example: OC12 Clear Channel on a Channelized OC12 IQ Interface 52
Verifying Your Work 53
Example: Complex Configuration for a Channelized OC12 IQ Interface 56
Verifying Your Work 63
Channelized OC12 66
SONET OC3 67
T3 68
Channelized T3 70
Channelized OC1 72
Channelized T1 74
T1 75
DS0 76
Example: Converting a Channelized OC12 IQ PIC to a Channelized STM4 IQ Interface 77
Verifying Your Configuration 81
Example: Channelized OC3 IQ Interface Configuration 83
Verifying Your Work 86
Channelized OC3 87
Channelized OC1 87
T3 87
Channelized T3 88
T1 88
Channelized T1 89
NxDS0 89
Clear Channel SONET OC3 89
Example: Channelized DS3 IQ Interface Configuration 90
Verifying Your Work 92
Example: Channelized T1 IQ Interface Configuration 96
Verifying Your Work 97
Example: Channelized STM1 IQ Interface Configuration 100
Verifying Your Work 103
Example: Channelized E1 IQ Interface Configuration 107
Verifying Your Work 108

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Example: DLCI Class of Service on a Channelized IQ Interface Configuration 111
Verifying Your Work 112

Chapter 4 Configuring Channelized E1 PRI and T1 PRI Interfaces 115

Channelized E1 PRI and T1 PRI Overview 115
Configuring a Clear Channel on a Dual-Port Channelized T1-E1 PIM 116
Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots 116
Configuring Primary Rate Interfaces 117
Example: Configuring a Channelized T1 Interface as Primary Rate Interface 119
Configuring PRI Interfaces 120
Allocating B-Channels for Dialout 121

Chapter 5 Configuring Channelized OC3 IQ and IQE Interfaces 123

Channelized OC3 IQ and IQE Overview 123
Partitions, OC Slices, Interface Types, and Time Slots 124
Configuring a Clear Channel on Channelized OC3 IQ and IQE PICs 125
Configuring T3 Interfaces on IQ and IQE Interfaces 126
Example: Configuring T3 Interfaces 126
Configuring T1 and NxDS0 Interfaces 126
Example: Configuring T1 and NxDS0 Interfaces 128
Example: Setting Remote Loopback and Running BERT Tests on NxDS0 Interfaces 129
Configuring Fractional T1 IQ Interfaces 130
Example: Configuring Fractional T1 IQ Interfaces 130
Configuring Link PIC Failover on Channelized OC3 IQ and IQE Interfaces 130

Chapter 6 Configuring Channelized OC12/STM4 Interfaces 133

Channelized OC12/STM4 IQ and IQE Interfaces Overview 133
Channelization of OC12 PIC (SONET Mode) 133
Configuring Channelized OC12 Interfaces 134
Example: Configuring Channelized OC12 Interfaces 135
Channelization of OC12/STM4 IQ and Channelized OC12/STM4 IQE PICs (SONET Mode) 137
Configuring Channelized OC12/STM4 IQ and IQE Interfaces (SONET Mode) . . . 138
Configuring an OC12/STM4 Interface 138
Configuring T3 Interfaces 138
Example: Configuring T3 Interfaces 140
Configuring OC3 Interfaces 140
Example: Configuring OC3 Interfaces 140
Configuring T1 Interfaces on Channelized OC12 IQ and IQE Interfaces 141
Example: Configuring T1 Interfaces 142
Configuring NxDS0 Interfaces 142
Example: Configuring NxDS0 Interfaces 144
Configuring Fractional T1 Interfaces 144
Example: Configuring Fractional T1 Interfaces 145
Channelization of OC12/STM4 IQE PIC (SDH Mode) 145

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Configuring Channelized OC12/STM4 IQE Interfaces (SDH Mode) 146
Configuring Channelized OC12/STM4 IQE PICs for SDH Mode 147
Configuring an Unpartitioned SDH (VC-4-4C) Interface on a Channelized OC12/STM4 IQE PIC 147
Example: Configuring an Unpartitioned SDH (VC-4-4C) Interface 147
Configuring SDH (VC-4) Interfaces on Channelized OC12/STM4 IQE PICs 148
Example: Configuring SDH (VC-4) Interfaces 148
Configuring Channelized AU-4 Interfaces 148
Example: Configuring Channelized AU-4 Interfaces 149
Configuring E3 Interfaces 149
Example: Configuring E3 Interfaces 150
Configuring E1 or Channelized E1 Interfaces 150
Example: Configuring E1 or Channelized CE1 Interfaces 151
Configuring NxDS0 Interfaces on Channelized OC12/STM4 IQE PICs 151
Example: Configuring NxDS0 Interfaces 151
Channelization of OC12/STM4 IQ PIC (SDH Mode) 151
Configuring Channelized OC12/STM4 IQ Interfaces (SDH Mode) 152
Configuring Channelized OC12/STM4 IQ PICs for SDH Mode 153
Configuring an Unpartitioned SDH (VC-4-4C) Interface on a Channelized OC12/STM4 IQ PIC 153
Example: Configuring an Unpartitioned SDH (VC-4-4C) Interface 154
Configuring SDH (VC-4) Interfaces on Channelized OC12/STM4 IQ PICs . . 154
Example: Configuring SDH (VC-4) Interfaces 154
Configuring Channelized AU-4 Interfaces 155
Example: Configuring Channelized AU-4 Interfaces 155
Configuring T3 or Channelized T3 Interfaces Under Channelized AU-4 Interfaces 155
Example: Configuring T3 or Channelized T3 Interfaces 156
Configuring T1 or Channelized T1 Interfaces Under Channelized AU-4 Interfaces 156
Example: Configuring T1 or Channelized T1 Interfaces Under Channelized AU-4 Interfaces 157
Configuring T1 or Channelized T1 Interfaces Under Channelized T3 Interfaces 157
Example: Configuring T1 or Channelized T1 Interfaces Under Channelized T3 Interfaces 157
Configuring NxDS0 Interfaces on Channelized OC12/STM4 IQ PICs 158
Example: Configuring NxDS0 Interfaces 158
Example: Configuring a Channelized OC12 IQ Interface as an Unpartitioned Clear Channel 158
Example: Configuring Channelized OC12 Interfaces with Partitioned Channels 162
Configuring Link PIC Failover on Channelized OC12/STM4 IQ and IQE Interfaces 163

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Chapter 7 Configuring Channelized OC48/STM16 IQE Interfaces 165
Channelized OC48/STM16 IQE Interfaces Overview 165
Configuring Channelized OC48/STM16 IQE Interfaces (SONET Mode) 167
Configuring OC12 Interfaces 167
Example: Configuring OC12 Interfaces 168
Configuring OC3 Interfaces 168
Example: Configuring OC3 Interfaces 169
Configuring T3 Interfaces 169
Example: Configuring T3 Interfaces 170
Configuring T1 Interfaces 170
Example: Configuring T1 Interfaces 171
Configuring Fractional T1 Interfaces 172
Example: Configuring Fractional T1 Interfaces 172
Configuring NxDS0 Interfaces 172
Example: Configuring NxDS0 Interfaces 174
Configuring Channelized OC48/STM16 IQE Interfaces (SDH Mode) 174
Configuring a Channelized OC48/STM16 IQE PIC for SDH Mode 175
Configuring Clear Channel STM1 and STM4 Interfaces 175
Configuring Channelized AU-4 Interfaces 176
Example: Configuring Channelized AU-4 Interfaces 176
Configuring E3 Interfaces 176
Example: Configuring E3 Interfaces 177
Configuring E1 or Channelized E1 Interfaces 177
Example: Configuring E1 and Channelized E1 Interfaces 178
Configuring NxDS0 IQE Interfaces 178
Example: Configuring NxDS0 IQE Interfaces 178
Configuring T3 or Channelized T3 Interfaces 178
Example: Configuring T3 or Channelized T3 Interfaces 179
Configuring T1 or Channelized T1 Interfaces 179
Example: Configuring T1 or Channelized T1 Interfaces 179
Example: Configuring Channelized OC48 Interfaces with Partitioned Channels 180
Configuring Link PIC Failover on Channelized OC48/STM16 IQE Interfaces 182
Chapter 8 Configuring Channelized STM1 Interfaces 183
Channelized STM1 Interfaces Overview 183
Configuring Channelized STM1 Interfaces 183
Configuring Channelized STM1 Interface Properties 184
Configuring Virtual Tributary Mapping of Channelized STM1 Interfaces 185
Example: Configuring Channelized STM1 Interfaces 192
Configuring Channelized STM1 IQ and IQE Interfaces 193
Configuring an STM1 IQ or STM1 IQE Interface 194
Configuring E1 IQ and IQE Interfaces 194
Example: Configuring E1 IQ and IQE Interfaces 195
Configuring Fractional E1 IQ and IQE Interfaces 195
Example: Configuring Fractional E1 Interfaces 196
Configuring an NxDS0 IQ Interface 196
Example: Configuring an NxDS0 IQ Interface 197
Example: Configuring Channelized STM1 IQ and IQE Interfaces 197

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Configuring Link PIC Failover on Channelized STM1 Interfaces 199

Chapter 9 **Configuring Channelized T1 Interfaces 201**

Channelized T1 IQ and IQE Interfaces Overview 201
Configuring Channelized T1 IQ and IQE Interfaces 201
Configuring T1 IQ and IQE Interfaces 201
Configuring Fractional T1 IQ and IQE Interfaces 202
Example: Configuring Fractional T1 IQ and IQE Interfaces 202
Configuring NxDS0 IQ and IQE Interfaces 203
Example: Configuring an NxDS0 IQ or IQE Interface 203
Configuring Payload Loopback 203
Configuring Channelized T1 Interface Properties 204
Example: Configuring Channelized T1 IQ and IQE Interfaces 205

Chapter 10 **Configuring Channelized T3 Interfaces 207**

Configuring the Junos OS to Enable Channelization on DS3/E3 MIC 207
Configuring the Channelized T3 Loop Timing 209
Configuring Channelized T3 IQ Interfaces 209
Configuring T3 IQ Interfaces 209
Configuring T1 IQ Interfaces 210
Example: Configuring T1 IQ and IQE Interfaces 210
Configuring Fractional T1 IQ and IQE Interfaces 210
Example: Configuring Fractional T1 IQ Interfaces 211
Configuring an NxDS0 IQ Interface 211
Example: Configuring an NxDS0 IQ Interface 212
Example: Configuring Channelized T3 IQ Interfaces 212
Configuring Channelized DS3-to-DS0 Interfaces 213
Examples: Configuring Channelized DS3-to-DS0 Interfaces 216
Configuring Channelized DS3-to-DS1 Interfaces 219
Examples: Configuring Channelized DS3-to-DS1 Interfaces 220

Part 3 **Troubleshooting Information**

Chapter 11 **General Troubleshooting Information 227**

Interface Diagnostics 227
Configuring Loopback Testing 227
Interface Diagnostics 229
Starting and Stopping a BERT Test 233
Example: Configuring Bit Error Rate Testing 233
Investigating Interface Steps and Commands 234
Investigating Interface Steps and Commands Overview 234
Monitoring Interfaces 234
Performing a Loopback Test on an Interface 235
Locating Interface Alarms 237

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Chapter 12 Troubleshooting Channelized DS3 Interfaces 239

Monitoring Channelized DS3 Interfaces 239
Checklist for Monitoring Channelized DS3 Interfaces 239
Monitor Channelized DS3 Interfaces 240
Display the Status of Channelized DS3 Interfaces 240
Display the Status of a Specific Channelized DS3 Interface 241
Display Extensive Status Information for a Specific Channelized DS3 Interface 244
Monitor Statistics for a Channelized DS3 Interface 249
Using Loopback Testing For Channelized DS3 Interfaces 252
Checklist for Using Loopback Testing for Channelized DS3 Interfaces 252
Diagnose a Suspected Hardware Problem with a Channelized DS3 Interface 253
Create a Loopback 253
Create a Physical Loopback 254
Configure a Local Loopback 254
Verify That the Interface Is Up 255
Clear Interface Statistics 256
Force the Link Layer to Stay Up 256
Configure Encapsulation to Cisco-HDLC 256
Configure No-Keepalives 258
Verify the Status of the Logical Interface 258
Ping the Channelized Interface 259
Check for Interface Error Statistics 259
Diagnose a Suspected Circuit Problem 261
Create a Loop from the Router to the Network 262
Create a Loop to the Router from Various Points in the Network 262
Locating Channelized DS3 Alarms and Errors 263
Checklist for Channelized DS3 Alarms and Errors 263
Display Alarms and Errors for Channelized DS3 Interfaces 263

Chapter 13 Troubleshooting Multichannel DS3 Interfaces 269

Monitoring Multichannel DS3 Interfaces 269
Checklist for Monitoring Multichannel DS3 Interfaces 269
Monitor Multichannel DS3 Interfaces 270
Display the Status of Channelized Interfaces 270
Display the Status of a Specific Channelized Interface 271
Display Extensive Status Information for a Specific T3 Interface 272

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Monitor Statistics for a Channelized Interface 275
Using Loopback Testing for Multichannel DS3 Interfaces 277
Checklist for Using Loopback Testing for Multichannel DS3 Interfaces 278
Diagnose a Suspected Hardware Problem with a Multichannel DS3 Interface 279
Create a Loopback 279
Create a Physical Loopback 280
Configure a Local Loopback 280
Verify That the Interface Is Up 281
Clear Interface Statistics 282
Force the Link Layer to Stay Up 283
Configure Encapsulation to Cisco-HDLC 283
Configure No-Keepalives 284
Verify the Status of the Logical Interface 284
Ping the Channelized Interface 285
Check for Interface Error Statistics 286
Diagnose a Suspected Circuit Problem 290
Create a Loop from the Router to the Network 290
Loop the Entire T3 Interface Toward the Network 290
Loop a Particular T1 Channel Toward the Network 291
Create a Loop to the Router from Various Points in the Network 292
Locating Multichannel DS3 Alarms and Errors 292
Checklist for Locating Multichannel DS3 Alarms and Errors 292
Display Alarms and Errors for Channelized DS3 to DS1 Interfaces 292
Display Alarms and Errors for Channelized DS3 to DS0 Interfaces 295

Chapter 14 Troubleshooting Channelized OC12 Interfaces 299

Monitoring Channelized OC12 Interfaces 299
Checklist for Monitoring Channelized OC12 Interfaces 299
Monitor Channelized OC12 Interfaces 300
Display the Status of Channelized OC12 Interfaces 300
Display the Status of a Specific Channelized OC12 Interface 301
Display Extensive Status Information for a Specific Channelized OC12 Interface 302
Monitor Statistics for a Channelized OC12 Interface 304
Monitor Channelized OC12 IQ Interfaces 305
Display the Status of a Channelized OC12 IQ Interface 305
Display the Status of the Controller Channelized OC12 IQ Interface . . . 309
Display the Status of a Specific Channel of a Channelized OC12 IQ Interface 311
Display Extensive Status Information for a Channelized OC12 IQ Interface 314

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Monitor Statistics for a Channelized OC12 IQ Interface . . . 316
Using Loopback Testing for Channelized OC12 Interfaces . . . 318
Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces . . . 318
Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface . . . 320
Create a Loopback . . . 320
Create a Physical Loopback . . . 320
Configure a Local Loopback . . . 321
Verify That the Interface Is Up . . . 322
Clear Interface Statistics . . . 324
Force the Link Layer to Stay Up . . . 325
Configure Encapsulation to Cisco-HDLC . . . 325
Configure No-Keepalives . . . 326
Verify the Status of the Logical Interface . . . 326
Ping the Channelized Interface . . . 327
Check for Interface Error Statistics . . . 328
Diagnose a Suspected Circuit Problem . . . 331
Loop the Entire T3 Interface Toward the Network . . . 331
Create a Loop to the Router from Various Points in the Network . . . 332
Locating Channelized OC12 Alarms and Errors . . . 332
Checklist for Channelized OC12 Alarms and Errors . . . 332
Display Channelized OC12 Alarms and Errors . . . 333
Display Channelized OC12 IQ Alarms and Errors . . . 336

Part 4 Configuration Statements and Operational Commands

Chapter 15 Configuration Statements . . . 343

[edit chassis] Hierarchy Level . . . 345
[edit interfaces] Hierarchy Level . . . 346
[edit logical-systems] Hierarchy Level . . . 362
address . . . 367
advertise-interval . . . 369
aps . . . 370
authentication-key . . . 371
bchannel-allocation . . . 371
bert-algorithm . . . 372
bert-error-rate . . . 374
bert-period . . . 376
byte-encoding . . . 377
bytes . . . 378
cbit-parity . . . 379
channelization . . . 379
clocking . . . 380
data-input . . . 381
dlci . . . 382
e1-options . . . 383
encapsulation (Logical Interface) . . . 384
encapsulation (Physical Interface) . . . 388

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family . . . 393
fast-aps-switch . . . 397
fcs . . . 398
feac-loop-respond . . . 399
force . . . 400
framing (E1, E3, and T1 Interfaces) . . . 401
hold-time (APS) . . . 402
idle-cycle-flag . . . 403
interface-type (Interfaces) . . . 404
inverse-arp . . . 405
invert-data . . . 406
isdn-options . . . 407
lmi-type . . . 408
lockout . . . 408
loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) . . . 409
mtu . . . 411
multicast-dlci . . . 413
multipoint-destination . . . 414
neighbor (Automatic Protection Switching for SONET/SDH) . . . 415
no-keepalives . . . 416
no-partition . . . 417
no-termination-request . . . 418
oc-slice . . . 419
paired-group . . . 419
partition . . . 420
protect-circuit . . . 421
request . . . 421
revert-time (Interfaces) . . . 422
sonet-options . . . 423
start-end-flag . . . 425
switching-mode . . . 426
t1-options . . . 427
t3-options . . . 428
timeslots . . . 429
translate-discard-eligible . . . 430
unit . . . 431
vtmapping . . . 437
working-circuit . . . 437
line-encoding . . . 438
start-end-flag . . . 439
ds0-options . . . 440
long-buildout . . . 441
start-end-flag . . . 442

Chapter 16 Operational Commands . . . 443

show class-of-service interface . . . 445
show class-of-service forwarding-table . . . 473
show interfaces (Channelized DS3-to-DS0) . . . 477
show interfaces (Channelized DS3-to-DS1) . . . 488

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show interfaces (Channelized E1 IQ) . . . 491
show interfaces (Channelized E1) . . . 495
show interfaces (Channelized OC12 IQ and IQE) . . . 506
show interfaces (Channelized OC12) . . . 510
show interfaces (Channelized OC3 IQ and IQE) . . . 514
show interfaces (Channelized STM1 IQ) . . . 533
show interfaces (Channelized STM1) . . . 536
show interfaces (Channelized T1 IQ) . . . 551
show interfaces (Channelized T3 IQ) . . . 563
show interfaces (Channelized E1) . . . 565
show interfaces (Channelized E1 IQ) . . . 576
show interfaces (T1, E1, or DS) . . . 580
show interfaces (Channelized E1) . . . 605
show interfaces (Channelized E1 IQ) . . . 616
show interfaces (Channelized T1 IQ) . . . 620
show interfaces (T1, E1, or DS) . . . 632
show interfaces (Channelized OC12) . . . 657
show interfaces (Channelized OC12 IQ and IQE) . . . 661
show interfaces (Channelized OC3 IQ and IQE) . . . 665
show interfaces controller (Channelized OC3 IQ and IQE) . . . 684
show interfaces (Aggregated SONET/SDH) . . . 685
show interfaces (Channelized DS3-to-DS0) . . . 692
show interfaces (Channelized DS3-to-DS1) . . . 703
show interfaces (Channelized E1 IQ) . . . 706
show interfaces (Channelized E1) . . . 710
show interfaces (Channelized OC12 IQ and IQE) . . . 721
show interfaces (Channelized OC12) . . . 725
show interfaces (Channelized OC3 IQ and IQE) . . . 729
show interfaces (Channelized OC48 IQ and IQE) . . . 748
show interfaces (Channelized STM1 IQ) . . . 750
show interfaces (Channelized STM1) . . . 753
show interfaces (Channelized T1 IQ) . . . 768
show interfaces (Channelized T3 IQ) . . . 780
show interfaces (SONET/SDH) . . . 782
show interfaces (T1, E1, or DS) . . . 810
show interfaces (T3 or E3) . . . 835
show interfaces (Channelized STM1) . . . 852
show interfaces (Channelized T1 IQ) . . . 867
show interfaces (T1, E1, or DS) . . . 879
show interfaces (Channelized DS3-to-DS0) . . . 904
show interfaces (Channelized DS3-to-DS1) . . . 915
show interfaces (Channelized T3 IQ) . . . 918
show interfaces (T1, E1, or DS) . . . 920
show interfaces (Channelized T1 IQ) . . . 945
show interfaces (T3 or E3) . . . 957
show interfaces controller (Channelized E1 IQ) . . . 974
show interfaces controller (Channelized OC12 IQ and IQE) . . . 975
show interfaces controller (Channelized OC3 IQ and IQE) . . . 977
show interfaces controller (Channelized STM1 IQ) . . . 978

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show interfaces controller (Channelized T1 IQ) 980
show interfaces controller (Channelized T3 IQ) 982

Part 5 Index

Index 985

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List of Figures

Part 1 Overview

Chapter 1 **Channelized Interfaces Overview 3**

Figure 1: Channelized OC48/STM16 IQE PIC (in SONET Mode) 17
Figure 2: Channelized OC48/STM16 IQE PIC (in SDH Mode) 17
Figure 3: Channelized OC12 IQ PIC and Channelized OC12/STM4 IQE PIC (in SONET Mode) 18
Figure 4: Channelized OC12/STM4 IQE PIC (in SDH Mode) 18
Figure 5: Channelized OC12/STM4 IQ PIC (in SDH Mode) 19
Figure 6: Channelized OC3 Ports (in SONET Mode) on Channelized OC3 IQ and Channelized OC3/STM1 IQE PICs 19
Figure 7: Channelized CSTM1 Ports (in SDH Mode) on Channelized OC3/STM1 IQE PIC 20
Figure 8: Channelized STM1 IQ PIC 20
Figure 9: Channelized CDS3/E3 IQE PIC (in DS3 Mode) 21
Figure 10: Channelized CDS3/E3 IQE PIC (in E3 Mode) 21
Figure 11: Channelized DS3 IQ PIC 21
Figure 12: Channelized T1 IQ and IQE PIC 21
Figure 13: Channelized E1 IQ and IQE PIC 22

Part 2 Configuring Channelized Interfaces

Chapter 3 **Configuring Channelized IQ Interfaces 37**

Figure 14: OC12 Clear Channel on a Channelized OC12 IQ Interface 52
Figure 15: Complex Configuration for a Channelized OC12 IQ Interface 56
Figure 16: Channelized OC12 IQ Interface in SDH Mode Example 78
Figure 17: Converted Channelized OC12 IQ Interface SDH Mapping Method 81
Figure 18: Channelized OC3 IQ Interface Example 83
Figure 19: Channelized DS3 IQ Interface Example 90
Figure 20: Channelized T1 IQ Interface Example 96
Figure 21: Channelized STM1 IQ Interface Example 100
Figure 22: Channelized STM1 IQ Interface SDH Mapping Method 103
Figure 23: Channelized E1 IQ Interface Example 107

Chapter 5 **Configuring Channelized OC3 IQ and IQE Interfaces 123**

Figure 24: Channelized OC3 IQ Interface Example for Show Interfaces Controller 124
Figure 25: T1 Interfaces on a Channelized OC3 PIC 128
Figure 26: Sample Channelization of OC3 IQ or IQE PIC 128

Chapter 6 **Configuring Channelized OC12/STM4 Interfaces 133**

Figure 27: Sample Channelization of OC12 PIC (non IQ and IQE) 134

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Figure 28: Sample Channelization of OC12/STM4 IQ or IQE PIC (SONET Mode) . . . 137
Figure 29: T1 Interfaces on a Channelized OC12 PIC . . . 142
Figure 30: Sample Channelization of OC12 IQE PIC . . . 144
Figure 31: Sample Channelization of OC12/STM4 IQE PIC (SDH Mode) . . . 145
Figure 32: Sample Channelization of OC12/STM4 IQ PIC (SDH Mode) . . . 152

Chapter 7 **Configuring Channelized OC48/STM16 IQE Interfaces . . . 165**

Figure 33: Sample Channelization of OC48/STM16 IQE PIC (SONET Mode) . . . 165
Figure 34: Sample Channelization of OC48/STM16 IQE PIC (SDH Mode) . . . 166
Figure 35: Sample Channelization of OC48/STM16 IQE PIC to E3 Channels . . . 167
Figure 36: T1 Interfaces on a Channelized OC48 PIC . . . 171
Figure 37: Sample Channelization of OC48 IQE PIC . . . 174

Chapter 10 **Configuring Channelized T3 Interfaces . . . 207**

Figure 38: Sample Channelization of DS3 IQ or IQE PIC . . . 212

Part 3 Troubleshooting Information

Chapter 14 **Troubleshooting Channelized OC12 Interfaces . . . 299**

Figure 39: Sample Configuration of Channelized OC12 IQ Interface . . . 307
Figure 40: Controller Interfaces at Different Levels of Channelization . . . 311
Figure 41: Specific Channels of a Channelized OC12 IQ Interface . . . 313

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List of Tables

About the Documentation xxi

Table 1: Notice Icons xxiii
Table 2: Text and Syntax Conventions xxiv

Part 1 Overview

Chapter 1 Channelized Interfaces Overview 3

Table 3: Frame Relay DLCI Limitations for Channelized Interfaces 6
Table 4: Per Unit Scheduler DLCI Limitations for Channelized Interfaces 7
Table 5: Protocol Family Combinations 8
Table 6: Clocking Capabilities by Channelized PIC Type 9
Table 7: Channel Scaling Numbers of MIC-3D-8CHOC3-4CHOC12 12
Table 8: Channel Scaling Numbers of MIC-3D-4CHOC3-2CHOC12 12
Table 9: Channel Scaling Numbers of MIC-3D-8DS3-E3 13
Table 10: Structural Differences: Channelized IQE PICs 23
Table 11: Structural Differences: Channelized IQ PICs 24
Table 12: Structural Differences: Channelized PICs 25

Part 2 Configuring Channelized Interfaces

Chapter 2 Configuring Channelized E1 Interfaces 29

Table 13: Ranges for Channelized E1 Configuration 30

Chapter 3 Configuring Channelized IQ Interfaces 37

Table 14: Frame Relay DLCI Limitations for Channelized Interfaces 42
Table 15: Scheduler Limitations for Channelized IQ Interfaces 50
Table 16: Complex Channelization for a Channelized OC12 IQ Interface 56

Chapter 6 Configuring Channelized OC12/STM4 Interfaces 133

Table 17: OC12-to-DS3 Numbering Scheme 134

Chapter 8 Configuring Channelized STM1 Interfaces 183

Table 18: Channelized STM1-to-E1 Channel Mapping 185
Table 19: Channelized STM1-to-T1 Channel Mapping 188

Chapter 9 Configuring Channelized T1 Interfaces 201

Table 20: Ranges for Channelized T1 IQ Configuration 204

Chapter 10 Configuring Channelized T3 Interfaces 207

Table 21: Ranges for Channelized DS3-to-DS0 Configuration 214

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Part 3 Troubleshooting Information

Chapter 11 General Troubleshooting Information 227

Table 22: Loopback Modes by Interface Type 228
Table 23: BERT Capabilities by Interface Type 232
Table 24: Commands Used to Monitor Interfaces 234
Table 25: Commands Used to Perform Loopback Testing on Interfaces 236

Chapter 12 Troubleshooting Channelized DS3 Interfaces 239

Table 26: Checklist for Monitoring Channelized DS3 Interfaces 239
Table 27: Checklist for Using Loopback Testing for Channelized DS3 Interfaces 252
Table 28: Checklist for Channelized DS3 Alarms and Errors 263
Table 29: T1 Media Alarms and Error Definitions 267

Chapter 13 Troubleshooting Multichannel DS3 Interfaces 269

Table 30: Checklist for Monitoring Multichannel DS3 Interfaces 269
Table 31: Problem Situations and Actions 277
Table 32: Checklist for Using Loopback Testing for Multichannel DS3 Interfaces 278
Table 33: Checklist for MultichannelDS3 Alarms and Errors 292
Table 34: T1 Media Alarms and Error Definitions 295
Table 35: T3 Interface Error Counter Definitions 298

Chapter 14 Troubleshooting Channelized OC12 Interfaces 299

Table 36: Checklist for Monitoring Channelized OC12 Interfaces 299
Table 37: Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces 319
Table 38: Checklist for Channelized OC12 Alarms and Errors 332
Table 39: T3 Interface Error Counter Definitions 335

Part 4 Configuration Statements and Operational Commands

Chapter 16 Operational Commands 443

Table 40: show class-of-service interface Output Fields 446
Table 41: Channelized DS3 show interfaces Output Fields 477
Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields 495
Table 43: Channelized OC show interfaces Output Fields 515
Table 44: Channelized STM1 show interfaces Output Fields 536
Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields 551
Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields 565
Table 47: T1 or E1 show interfaces Output Fields 581
Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields 605
Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields 620
Table 50: T1 or E1 show interfaces Output Fields 633
Table 51: Channelized OC show interfaces Output Fields 666
Table 52: Channelized OC3 IQ and IQE show interfaces controller Output Fields 684

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Table 53: Aggregated SONET/SDH show interfaces Output Fields 685
Table 54: Channelized DS3 show interfaces Output Fields 692
Table 55: Channelized E1 and Channelized E1 IQ show interfaces Output Fields 710
Table 56: Channelized OC show interfaces Output Fields 730
Table 57: Channelized STM1 show interfaces Output Fields 753
Table 58: Channelized T1 IQ and T3 IQ show interfaces Output Fields 768
Table 59: SONET/SDH show interfaces Output Fields 783
Table 60: T1 or E1 show interfaces Output Fields 811
Table 61: T3 or E3 show interfaces Output Fields 835
Table 62: Channelized STM1 show interfaces Output Fields 852
Table 63: Channelized T1 IQ and T3 IQ show interfaces Output Fields 867
Table 64: T1 or E1 show interfaces Output Fields 880
Table 65: Channelized DS3 show interfaces Output Fields 904
Table 66: T1 or E1 show interfaces Output Fields 921
Table 67: Channelized T1 IQ and T3 IQ show interfaces Output Fields 945
Table 68: T3 or E3 show interfaces Output Fields 957
Table 69: Channelized E1 IQ show interfaces controller Output Fields 974
Table 70: Channelized OC12 IQ and IQE show interfaces controller Output Fields 975
Table 71: Channelized OC3 IQ and IQE show interfaces controller Output Fields 977
Table 72: Channelized STM1 IQ show interfaces controller Output Fields 978
Table 73: Channelized T1 IQ show interfaces controller Output Fields 980
Table 74: Channelized T3 IQ show interfaces controller Output Fields 982

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About the Documentation

- Documentation and Release Notes on page xxi
- Supported Platforms on page xxi
- Using the Examples in This Manual on page xxi
- Documentation Conventions on page xxiii
- Documentation Feedback on page xxv
- Requesting Technical Support on page xxv

Documentation and Release Notes

To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at http://www.juniper.net/techpubs/.

If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

Juniper Networks Books publishes books by Juniper Networks engineers and subject matter experts. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration. The current list can be viewed at http://www.juniper.net/books.

Supported Platforms

For the features described in this document, the following platforms are supported:

- M Series
- MX Series
- T Series
- J Series

Using the Examples in This Manual

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. The example does not become active until you commit the candidate configuration.

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If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

If the example configuration does not start at the top level of the hierarchy, the example is a *snippet*. In this case, use the **load merge relative** command. These procedures are described in the following sections.

Merging a Full Example

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

   For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

   ```
   system {
     scripts {
       commit {
         file ex-script.xsl;
       }
     }
   }
   interfaces {
     fxp0 {
       disable;
       unit 0 {
         family inet {
           address 10.0.0.1/24;
         }
       }
     }
   }
   ```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

   ```
   [edit]
   user@host# load merge /var/tmp/ex-script.conf
   load complete
   ```

Merging a Snippet

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

   For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

   ```
   commit {
     file ex-script-snippet.xsl; }
   ```


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2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:

```
[edit]
user@host# edit system scripts
[edit system scripts]
```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

```
[edit system scripts]
user@host# load merge relative /var/tmp/ex-script-snippet.conf
load complete
```

For more information about the **load** command, see the *CLI User Guide*.

Documentation Conventions

Table 1 on page xxiii defines notice icons used in this guide.

Table 1: Notice Icons

Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.
	Tip	Indicates helpful information.
	Best practice	Alerts you to a recommended use or implementation.

Table 2 on page xxiv defines the text and syntax conventions used in this guide.

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Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the **configure** command: user@host> **configure**
`Fixed-width text like this`	Represents output that appears on the terminal screen.	`user@host>` **show chassis alarms** `No alarms currently active`
Italic text like this	• Introduces or emphasizes important new terms. • Identifies guide names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS CLI User Guide* • RFC 1997, *BGP Communities Attribute*
Italic text like this	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# **set system domain-name** *domain-name*
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	• To configure a stub area, include the **stub** statement at the **[edit protocols ospf area area-id]** hierarchy level. • The console port is labeled **CONSOLE**.
< > (angle brackets)	Encloses optional keywords or variables.	**stub <default-metric** *metric***>;**
| (pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	**broadcast | multicast** **(*string1* | *string2* | *string3*)**
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	**rsvp { # Required for dynamic MPLS only**
[ ] (square brackets)	Encloses a variable for which you can substitute one or more values.	**community name members [** ***community-ids*** **]**

Indention and braces ({ })	Identifies a level in the configuration hierarchy.	[edit]
		routing-options {
		  static {
		  route default {
		  nexthop *address*;
		  retain;
		  }
		  }
		}

; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	

GUI Conventions

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Table 2: Text and Syntax Conventions *(continued)*

Convention	Description	Examples
Bold text like this	Represents graphical user interface (GUI) items you click or select.	• In the Logical Interfaces box, select **All Interfaces**. • To cancel the configuration, click **Cancel**.
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select **Protocols>Ospf**.

Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can provide feedback by using either of the following methods:

- Online feedback rating system—On any page at the Juniper Networks Technical Documentation site at http://www.juniper.net/techpubs/index.html, simply click the stars to rate the content, and use the pop-up form to provide us with information about your experience. Alternately, you can use the online feedback form at https://www.juniper.net/cgi-bin/docbugreport/.
- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or JNASC support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf.
- Product warranties—For product warranty information, visit http://www.juniper.net/support/warranty/.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

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- Find CSC offerings: http://www.juniper.net/customers/support/
- Search for known bugs: http://www2.juniper.net/kb/
- Find product documentation: http://www.juniper.net/techpubs/
- Find solutions and answer questions using our Knowledge Base: http://kb.juniper.net/
- Download the latest versions of software and review release notes: http://www.juniper.net/customers/csc/software/
- Search technical bulletins for relevant hardware and software notifications: http://kb.juniper.net/InfoCenter/
- Join and participate in the Juniper Networks Community Forum: http://www.juniper.net/company/communities/
- Open a case online in the CSC Case Management tool: http://www.juniper.net/cm/

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: https://tools.juniper.net/SerialNumberEntitlementSearch/

Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at http://www.juniper.net/cm/.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see http://www.juniper.net/support/requesting-support.html.

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PART 1

Overview

- Channelized Interfaces Overview on page 3

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CHAPTER 1

Channelized Interfaces Overview

- Channelized Interfaces Overview on page 3
- Channelized Interface Capabilities on page 4
- Data-Link Connection Identifiers on Channelized Interfaces on page 6
- Clock Sources on Channelized Interfaces on page 8
- Channel Scaling Numbers of Channelized SONET/SDH OC3/STM1 (Multi-Rate) MICs with SFP on page 12
- Channel Scaling Numbers of DS3/E3 MIC on page 13
- Channelized E1 and T1 PIM Properties on page 14
- Channelized IQ and IQE Interfaces Properties on page 14
- Structure of Channelized IQ and Channelized IQE PICs on page 16

Channelized Interfaces Overview

Channelized interfaces enable you to configure a number of individual channels that subdivide the bandwidth of a larger interface and minimize the number of Physical Interface Cards (PICs) that an installation requires.

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NOTE: Channelized intelligent queuing (IQ) and channelized enhanced intelligent queuing (IQE) interfaces require M Series Enhanced Flexible PIC Concentrators (FPCs) and MX Series Enhanced Flexible PIC Concentrators (FPCs).

Wherever Junos configuration guides refer to channelized interfaces and PICs without the "intelligent queuing IQ or IQE" descriptor, they are referring to the original channelized interfaces and PICs.

On M40e routers, all supported interface types support a maximum number of 784 traffic-bearing interfaces that can be created per interface port and includes ports on channelized PICs.

MX Series routers support two Type 2 Channelized IQ PICs: OC12/STM4 IQE PIC with SFP and OC48/STM16 IQE PIC with SFP. Each channelized OC12/STM4 PIC supports 4 ports, and the channelized OC48/STM16 PIC supports one port.

T640 and TX Matrix routers support Type 3 Channelized IQE PICs: 4xCOC12 IQE PIC with SFP.

Channelized 4xCOC12 IQE PICs support deep-channelization of up to six OC slices (STS1) per port. For example, only six OC slices can be channelized to CT1/T1 or CE1/E1.

Channelized COC48 IQE PICs support deep-channelization of up to six OC slices (STS1) in a block of 12 contiguous OC slices. For example, only six OC slices out of OC slice 1-12 can be channelized to CT1/T1 or CE1/E1. The PIC supports deep-channelization of maximum 24 OC slices in this way.

Channelized OC48 IQE PICs do not support STS-48 clear-channel mode.

IQ and IQE PICs do not support aggregated SONET (link bonding).

For channelized IQ and IQE logical interfaces, you can configure class of service (CoS). For more information, see the *Class of Service Feature Guide for Routing Devices*.

Related Documentation

- Channelized Interface Capabilities on page 4

Channelized Interface Capabilities

You can configure each port of a channelized IQ PIC or channelized IQE PIC as a single interface that uses the entire available bandwidth, or partition each port into smaller data channels. In either case, you start with a channelized interface (designated by a **c** in the interface name, as in **coc12**). From the channelized interfaces, you configure data channels. Following are the channelized interface names and data-channel interface names associated with channelized IQ and IQE PICs.

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Channelized Interface Names

This section lists the channelized interface names.

- **coc48-*fpc/pic/port***—Channelized OC48 IQE interface. Configure on a Channelized OC48 IQE PIC.
- **coc12-*fpc/pic/port***—Channelized OC12 interface. Configure on Channelized OC12 IQ or IQE PICs.
- **coc3-*fpc/pic/port*:*channel***—Channelized OC3 interface. Configure on Channelized OC3 IQ or IQE, Channelized OC12 IQ or IQE PICs.
- **coc1-*fpc/pic/port*:*channel***—Channelized OC1 interface. Configure on Channelized OC3 IQ or IQE, Channelized OC12 IQ or IQE, or Channelized OC48 IQE PICs.
- **ct3-*fpc/pic/port*:*channel***—Channelized T3 interface. Configure on Channelized OC3 IQ or IQE, Channelized OC12 IQ or IQE, Channelized OC48 IQE, or Channelized DS3 IQ or IQE PICs.
- **cstm16-*fpc/pic/port***—Channelized STM16 interface. Configure on a Channelized OC48 IQE PIC in SDH mode.
- **cstm4-*fpc/pic/port***—Channelized STM4 interface. Configure on a Channelized OC12 IQ or IQE PIC in SDH mode.
- **cstm1-*fpc/pic/port***—Channelized STM1 interface. Configure on a Channelized STM1 IQ or IQE PIC.
- **cau4-*fpc/pic/port*:*channel***—Channelized AU-4 IQ interface. Configure on Channelized STM1 IQ or IQE, Channelized OC48 IQE, or Channelized OC12 IQE PICs.
- **ct1-*fpc/pic/port*:*channel***—Channelized T1 interface. Configure on Channelized OC3 IQ or IQE, Channelized OC12 IQ or IQE, Channelized T1 IQ or IQE, Channelized OC48 IQE, or Channelized DS3 IQ or IQE PICs.
- **ce1-*fpc/pic/port*:*channel***—Channelized E1 interface. Configure on Channelized E1 IQ or IQE, Channelized STM1 IQ or IQE, Channelized OC48/STM16 IQE, or Channelized OC12/STM4 IQE PICs.

Data-Channel Interface Names

This section lists the data-channel interface names.

- **e1-*fpc/pic/port*:*channel***—E1 channel. Configure on Channelized E1 IQ or IQE, Channelized STM1 IQ or IQE, Channelized OC12/STM4 IQE, or Channelized OC48/STM16 IQE PICs.
- **e3-*fpc/pic/port*:*channel***—E3 channel. Configure on Channelized OC3/STM1 IQE, or Channelized OC12/STM4 IQE, Channelized OC48 IQE, or Channelized/Clear channel DS3E3 IQE or E3 IQ PICs.
- **ds-*fpc/pic/port*:*channel***—*N*xDS0 channel. Configure on Channelized OC3 IQ or IQE, Channelized OC12 IQ or IQE, Channelized OC48/STM16 IQE, Channelized STM1 IQ or IQE, Channelized DS3 IQ or IQE, Channelized T1 IQ, or Channelized E1 IQ or IQE PICs.
- **so-*fpc/pic/port*:*channel***—SONET/SDH channel. Configure one OC3 channel on a Channelized OC3 IQ or IQE, four OC3 channels on a Channelized OC12 IQ or IQE, one OC12 channel on a Channelized OC12 IQ or IQE, four OC12 channels on Channelized OC48 IQE, or one STM1 channel on a Channelized STM1 IQ or IQE PICs.

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- **t1-*fpc/pic/port*:*channel***—T1 channel. Configure on Channelized T1 IQ or IQE, Channelized OC3 IQ or IQE, Channelized OC12 IQ or IQE, Channelized OC48 IQE, or Channelized DS3 IQ or IQE PICs.
- **t3-*fpc/pic/port*:*channel***—T3 channel. Configure on Channelized OC3 IQ or IQE, Channelized OC12 IQ or IQE, Channelized OC48 IQE, Clear Channel DS3E3 IQE, or Channelized DS3 IQ or IQE PICs.

Related Documentation

- Channelized Interfaces Overview on page 3

Data-Link Connection Identifiers on Channelized Interfaces

If you use Frame Relay encapsulation on a channelized interface, see Table 3 on page 6 for the maximum number of data-link connection identifiers (DLCIs) per channel that you can configure at each channel level for various channelized PICs.

If you use a per-unit-scheduler configuration on a channelized interface, see Table 4 on page 7 for the maximum number of data-link connection identifiers (DLCIs) per channel that you can configure at each channel level for various channelized PICs.

NOTE: The actual number of DLCIs you can configure for each channel is determined by the capabilities of your system, such as the number and types of PICs installed. If the number of DLCIs in the configuration exceeds the capabilities of your system, the router might not be able to support the maximum DLCI values shown in Table 3 on page 6. To determine the capabilities of your system, please contact Juniper Networks customer support.

Table 3: Frame Relay DLCI Limitations for Channelized Interfaces

PIC Types	Number of DLCIs per Level	Range
Original Channelized PICs		
DS0 level channels	3 for sparse mode	1–1022 for sparse mode (0 is reserved for the Local Management Interface [LMI])
T3 and T1 level channels	63 for regular mode	1–63 for regular mode
	3 for sparse mode	1–1022 for sparse mode (0 is reserved for the LMI)
Channelized IQ and IQE PICs		
DS0 level channels (Channelized DS3 IQ or IQE, Channelized STM1 IQ or IQE, Channelized E1 IQ or IQE, Channelized OC3 IQ or IQE, or Channelized OC12 IQ or IQE PICs)	16	1–1022 (0 is reserved for the LMI)

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Table 3: Frame Relay DLCI Limitations for Channelized Interfaces *(continued)*

PIC Types	Number of DLCIs per Level	Range
E1 level channels (Channelized E1 IQ or IQE PIC)	64	1–1022 (0 is reserved for the LMI)
E1 level channels (Channelized STM1 IQ or IQE PIC)	64	1–1022 (0 is reserved for the LMI)
OC3 level channels (Channelized OC3 IQ or IQE, or Channelized OC12 IQ or IQE PIC)	1022	1–1022 (0 is reserved for the LMI)
OC12 level channels (Channelized OC12 IQ or IQE, Channelized OC48/STM16 IQE PICs, and (per port on) OC12 ports on 4xOC12/STM4 IQE PICs)	1022	1–1022 (0 is reserved for the LMI)
STM1 level channel (Channelized STM1 IQ or IQE PIC)	1022	1–1022 (0 is reserved for the LMI)
T1 level channels (Channelized DS3 IQ or IQE PIC)	64	1–1022 (0 is reserved for the LMI)
T1 level channels (Channelized OC3 IQ or IQE, or Channelized OC12 IQ or IQE PIC)	64	1–1022 (0 is reserved for the LMI)
T3 level channel (Channelized DS3 IQ or IQE, Channelized OC3 IQ or IQE, or Channelized OC12 IQ or IQE PIC)	1022	1–1022 (0 is reserved for the LMI)

Table 4: Per Unit Scheduler DLCI Limitations for Channelized Interfaces

PIC Types	Number of DLCIs per Level			
	Non M40e Platforms		M40e Platform Only	
	With Per-Unit-Scheduler	Without Per-Unit-Scheduler	With Per-Unit-Scheduler	Without Per-Unit-Scheduler
DS0 level channels	64	64	16	16
T1/E1 level channels	64	64	64	64
DS3/E3 level channels	975	† Protocol family combinations apply	256	256
SONET	975	† Protocol family combinations apply	975	† Protocol family combinations apply

† In these router, PIC, and scheduler configurations, combining multiple protocol families per PIC changes the number of Frame Relay DLCIs as shown in Table 5 on page 8.

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Table 5: Protocol Family Combinations

Protocol Family Combinations	Number of DLCIs per PIC
inet	3600
inet6	3600
mpls	3000
inet, inet6	2400
inet, mpls	2000
inet6, mpls	2000
inet, inet6, mpls	1550

Related Documentation

- Channelized Interfaces Overview on page 3

Clock Sources on Channelized Interfaces

Channelized interfaces, channelized IQ interfaces, and channelized IQE interfaces have different clocking capabilities. For channelized IQ and IQE interfaces, you can configure clocking on each interface independently by including the **clocking (internal | external)** statement at the **[edit interfaces *interface-name*]** hierarchy level.

For channelized IQ and IQE interfaces, clocking is provided as follows:

- For all channelized IQ and IQE PICs, the **clocking** statement is supported on all channels. To configure clocking on individual interfaces, include the **clocking** statement at the **[edit interfaces *type-fpc/pic/port*:*channel*]** hierarchy level. If you do not include the **clocking** statement, the individual interfaces use internal clocking by default.
- SONET/SDH-level clocking is provided at the root controller interface at the **[edit interfaces *type-fpc/pic/port*]** hierarchy level.
- Configure T3-level clocking by including the **clocking** statement at the **[edit interfaces ct3-*fpc/pic/port*]** hierarchy level.
- Configure T1-level clocking by including the **clocking** statement at the **[edit interfaces t1-*fpc/pic/port*:*channel*]** hierarchy level.
- Configure E1-level clocking by including the **clocking** statement at the **[edit interfaces ce1-*fpc/pic/port*]** hierarchy level.
- Configure clocking for all *N*xDS0 channels by including the **clocking** statement at the **[edit interfaces ct1-*fpc/pic/port*:*channel*]** or **[edit interfaces ce1-*fpc/pic/port*]** hierarchy level.

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- The **clocking** statement is ignored if you include it at the **[edit interfaces coc1-*fpc/pic/port*:*channel*]** or **[edit interfaces cau4-*fpc/pic/port*:*channel*]** hierarchy level.
- SONET/SDH level clocking is applicable only at the controller interfaces for channelized IQ and IQE PICs. Clocking configuration is not effective at the **so-*fpc/pic/port*** or **so-*fpc/pic/port*:*channel*** for channelized IQ and IQE PICs.

For non-IQ and non-IQE channelized interfaces, clocking at each channel level is provided as follows:

- For Channelized OC12, DS3, and E1 PICs, the **clocking** statement is supported only for channel 0; it is ignored if included in the configuration of other channels. The clock source configured for channel 0 applies to all channels on these channelized interfaces.
- For the Channelized STM1 PIC, the **clocking** statement is supported on channels 0 through 62. To configure clocking on the STM1 interface, include the **loop-timing** statement at the **[edit interfaces e1-*fpc/pic/port*:0 sonet-options]** hierarchy level. To configure clocking on individual E1 interfaces, include the **clocking** statement at the **[edit interfaces e1-*fpc/pic/port*:*channel*]** hierarchy level. The channel number can be 0 through 62. If you do not include the **clocking** statement, the individual E1 interfaces use internal clocking by default.
- For channelized STM1 interfaces, you should configure the clock source at one side of the connection to be internal and configure the other side of the connection to be external.
- When you configure the clock source for a channelized interface—**t3-*fpc/pic/port*:0**, for example—you must also include the **channel-group** statement at the **[edit chassis]** hierarchy level, and specify channel group 0.

Table 6 on page 9 lists the clocking capabilities for each channelized PIC.

Table 6: Clocking Capabilities by Channelized PIC Type

PIC Type	SONET/SDH Level	DS3 Level	DS1/E1 Level
Channelized PICs			
Channelized DS3 and Multichannel DS3	Not applicable.	The **loop-timing** statement is supported at the **[edit interfaces t1-*fpc/pic/port*:0 t3-options]** or **[edit interfaces *fpc/pic/port*:0:0 t3-options]** hierarchy level.	The **clocking** statement is supported at the **[edit interfaces t1-*fpc/pic/port*:0]** or **[edit interfaces ds-*fpc/pic/port*:0:0]** hierarchy level.
Channelized E1	Not applicable.	Not applicable.	The **clocking** statement is supported at the **[edit interfaces e1-*fpc/pic/port*:0]** or **[edit interfaces ds-*fpc/pic/port*:0]** hierarchy level.
Channelized OC12	Not configurable.	The **clocking** statement is supported at the **[edit interfaces t3-*fpc/pic/port*:0]** hierarchy level.	Not applicable.

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Table 6: Clocking Capabilities by Channelized PIC Type *(continued)*

PIC Type	SONET/SDH Level	DS3 Level	DS1/E1 Level
Channelized STM1	Not configurable.	Not applicable.	The **clocking** statement is supported at the **[edit interfaces e1-*fpc/pic/port*:[0-62]]** hierarchy level.
Channelized IQ and IQE PICs			
Channelized DS3 IQ or IQE	Not applicable.	The **clocking** statement is supported at the **[edit interfaces ct3-*fpc/pic/port*]** hierarchy level. The **clocking** statement is ignored if you include it at the **[edit interfaces t3-*fpc/pic/port*]** hierarchy level.	For T1 channels, the **clocking** statement is supported at the **[edit interfaces t1-*fpc/pic/port*:[1-28]]** hierarchy level. For *N*xDS0 channels, the **clocking** statement is supported at the **[edit interfaces ct1-*fpc/pic/port*:[1-28]]** hierarchy level.
Channelized E1 IQ	Not applicable.	Not applicable.	For E1 and *N*xDS0 channels, the **clocking** statement is supported at the **[edit interfaces ce1-*fpc/pic/port*]** hierarchy level. The **clocking** statement is ignored if you include it at the **[edit interfaces e1-*fpc/pic/port*]** hierarchy level.
Channelized OC3 IQ or IQE	The **clocking** statement is supported at the **[edit interfaces coc3-*fpc/pic/port*]** hierarchy level. The **clocking** statement is ignored if you include it at the **[edit interfaces so-*fpc/pic/port*]** hierarchy level.	The **clocking** statement is supported at the **[edit interfaces t3-*fpc/pic/port*:[1-12]]** hierarchy level. The **clocking** statement is ignored if you include it at the **[edit interfaces coc1-*fpc/pic/port*:*channel*]** hierarchy level.	The **clocking** statement is supported at the **[edit interfaces ct1-*fpc/pic/port*:[1-12]:[1-28]]** and **[edit interfaces t1-*fpc/pic/port*:[1-12]:[1-28]]** hierarchy levels.
Channelized OC12 IQ or IQE	The **clocking** statement is supported at the **[edit interfaces coc12-*fpc/pic/port*]** hierarchy level. The **clocking** statement is ignored if you include it at the **[edit interfaces so-*fpc/pic/port*]** hierarchy level.	The **clocking** statement is supported at the **[edit interfaces t3-*fpc/pic/port*:[1-12]]** hierarchy level. The **clocking** statement is ignored if you include it at the **[edit interfaces coc1-*fpc/pic/port*:*channel*]** hierarchy level.	The **clocking** statement is supported at the **[edit interfaces ct1-*fpc/pic/port*:[1-12]:[1-28]]** and **[edit interfaces t1-*fpc/pic/port*:[1-12]:[1-28]]** hierarchy levels.

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Table 6: Clocking Capabilities by Channelized PIC Type *(continued)*

PIC Type	SONET/SDH Level	DS3 Level	DS1/E1 Level
Channelized OC48 IQE	The **clocking** statement is supported at the **[edit interfaces coc48-*fpc/pic/port*]** hierarchy level. The **clocking** statement is ignored if you include it at the **[edit interfaces so-*fpc/pic/port*]** hierarchy level.	The **clocking** statement is supported at the **[edit interfaces t3-*fpc/pic/port*:[1-48]]** hierarchy level. The **clocking** statement is ignored if you include it at the **[edit interfaces coc1-*fpc/pic/port:channel*]** hierarchy level.	The **clocking** statement is supported at the **[edit interfaces ct1*fpc/pic/port*:[1-48]:[1-28]]** and **[edit interfaces t1-*fpc/pic/port*:[1-48]:[1-28]]** hierarchy levels.
Channelized STM1 IQ or IQE	The **clocking** statement is supported at the **[edit interfaces cstm1-*fpc/pic/port*]** hierarchy level. The **clocking** statement is ignored if you include it at the **[edit interfaces cau4-*fpc/pic/port:channel*]** or **[edit interfaces so-*fpc/pic/port*]** hierarchy level.	Not applicable.	For E1 and *N*xDS0 channels, the **clocking** statement is supported at the **[edit interfaces ce1-*fpc/pic/port*[1-63]]** hierarchy level. The **clocking** statement is ignored if you include it at the **[edit interfaces e1-*fpc/pic/port*]** hierarchy level.
Channelized STM4 IQ or IQE	The **clocking** statement is supported at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level. The **clocking** statement is ignored if you include it at the **[edit interfaces cau4-*fpc/pic/port:channel*]** or **[edit interfaces so-*fpc/pic/port*]** hierarchy level.	Not applicable.	For E1 and *N*xDS0 channels, the **clocking** statement is supported at the **[edit interfaces ce1-*fpc/pic/port*[1-4]:[1-63]]** hierarchy level. The **clocking** statement is ignored if you include it at the **[edit interfaces e1-*fpc/pic/port*]** hierarchy level.
Channelized STM16 IQE	The **clocking** statement is supported at the **[edit interfaces cstm16-*fpc/pic/port*]** hierarchy level. The **clocking** statement is ignored if you include it at the **[edit interfaces cau4-*fpc/pic/port:channel*]** or **[edit interfaces so-*fpc/pic/port*]** hierarchy level.	Not applicable.	For E1 and *N*xDS0 channels, the **clocking** statement is supported at the **[edit interfaces ce1-*fpc/pic/port*[1-16]:[1-63]]** hierarchy level. The **clocking** statement is ignored if you include it at the **[edit interfaces e1-*fpc/pic/port*]** hierarchy level.

Related Documentation

- clocking on page 380

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Channel Scaling Numbers of Channelized SONET/SDH OC3/STM1 (Multi-Rate) MICs with SFP

There are two types of Channelized SONET/SDH OC3/STM1 (Multi-Rate) MICs with SFP—the 8-port Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP (model number: MIC-3D-8CHOC3-4CHOC12), and the 4-port Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP (model number: MIC-3D-4CHOC3-2CHOC12). These MICs support POS/PDH interfaces on the MX80 3D Universal Edge Routers and other MX Series routers using the MX-MPC1-3D-Q, MX-MPC2-3D-Q, and MX-MPC2-3D-EQ MPCs to position a single device to meet multiservice edge requirements.

Channel scaling numbers of the 8-port Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP are listed in Table 7 on page 12.

Table 7: Channel Scaling Numbers of MIC-3D-8CHOC3-4CHOC12

SONET Channel Scaling Numbers	SDH Channel Scaling Numbers
• 4xSTS12c • 16xSTS3c (when all ports are configured as channelized OC12) • 8xSTS3c (when all ports are configured as channelized OC3)	• 4xSTM4 • 16xSTM1 (when all ports are configured as channelized STM4) • 8xSTM1 (when all ports are configured as channelized STM1)
• 48xDS3 (when all ports are configured as channelized OC12) • 24xDS3 (when all ports are configured as channelized OC3)	• 48xE3 (when all ports are configured as channelized STM4) • 24xE3 (when all ports are configured as channelized STM1)
• 672xDS1 • 168xDS1 per channelized OC12 when the port is configured as channelized OC12 • 84xDS1 per channelized OC3 when the port is configured as channelized OC3	• 504xE1 • 126xE1 per channelized STM4 when the port is configured as channelized STM4 • 62xE1 per channelized STM1 when the port is configured as channelized STM1
• 4044xDS0 • 1011xDS0 per channelized OC12 when the port is configured as channelized OC12 • 1011xDS0 per two channelized OC3 when the port is configured as channelized OC3	• 4044xDS0 • 1011xDS0 per channelized STM4 when the port is configured as channelized STM4 • 1011xDS0 per two channelized STM1 when the port is configured as channelized STM1

Channel scaling numbers of the 4-port Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP are listed in Table 8 on page 12.

Table 8: Channel Scaling Numbers of MIC-3D-4CHOC3-2CHOC12

SONET Channel Scaling Numbers	SDH Channel Scaling Numbers
• 2xSTS12c • 8xSTS3c (when all ports are configured as channelized OC12) • 4xSTS3c (when all ports are configured as channelized OC3)	• 2xSTM4 • 8xSTM1 (when all ports are configured as channelized STM4) • 4xSTM1 (when all ports are configured as channelized STM1)

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Table 8: Channel Scaling Numbers of MIC-3D-4CHOC3-2CHOC12 *(continued)*

SONET Channel Scaling Numbers	SDH Channel Scaling Numbers
• 24xDS3 (when all ports are configured as channelized OC12) • 12xDS3 (when all ports are configured as channelized OC3)	• 24xE3 (when all ports are configured as channelized STM4) • 12xE3 (when all ports are configured as channelized STM1)
• 336xDS1 • 168xDS1 per channelized OC12 when the port is configured as channelized OC12 • 84xDS1 per channelized OC3 when the port is configured as channelized OC3	• 252xE1 • 126xE1 per channelized STM4 when the port is configured as channelized STM4 • 62xE1 per channelized STM1 when the port is configured as channelized STM1
• 2022xDS0 • 1011xDS0 per channelized OC12 when the port is configured as channelized OC12 • 1011xDS0 per two channelized OC3 when the port is configured as channelized OC3	• 2022xDS0 • 1011xDS0 per channelized STM4 when the port is configured as channelized STM4 • 1011xDS0 per two channelized STM1 when the port is configured as channelized STM1

NOTE: When a port is configured as channelized OC12, only six of the twelve OC1 slices can be deep-channelized from T1 through DS0. The remaining six OC1 slices can be channelized only to T3 or can be combined to form two OC3 slices. They cannot be channelized to T1 or DS0.

Related Documentation

- Channel Scaling Numbers of DS3/E3 MIC on page 13

Channel Scaling Numbers of DS3/E3 MIC

You can configure the DS3/E3 MIC (model number: MIC-3D-8DS3-E3) to function either in clear-channel mode or in channelized mode. When functioning in channelized mode, the DS3/E3 MIC supports PDH interfaces on the MX80 3D Universal Edge Router and MX Series routers that use MX-MPC1-3D-Q, MX-MPC2-3D-Q, or MX-MPC2-3D-EQ. When functioning in clear-channel mode, this MIC also supports PDH interfaces on the MX-MPC1-3D and MX-MPC2-3D MPCs.

Channel scaling numbers of the DS3/E3 MIC are listed in Table 9 on page 13.

Table 9: Channel Scaling Numbers of MIC-3D-8DS3-E3

DS3	E3
8xDS3	8xE3
224xDS1	
2038xDS0	

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Related Documentation

- Configuring the Junos OS to Enable Channelization on DS3/E3 MIC on page 207
- channelization on page 379

Channelized E1 and T1 PIM Properties

Channelized E1 and T1 PIMs on J Series routers provide support for ISDN Primary Rate Interface (PRI) connectivity for dial-in and callback and for use as primary or backup network connections. You can configure up to 30 channelized E1 time slots (**ce1-*pim*/0/*port***) or 23 channelized T1 time slots (**ct1-*pim*/0/*port*)** as an ISDN PRI group, with the 16th E1 time slot or the 24th T1 time slot operating as the D-channel to control the group of time slots as B-channels. These B-channels can operate unconfigured. The encapsulation type **multilink-ppp**, **cisco-hdlc**, or **ppp** is configured under the dialer interface.

For more information about configuring the dialer interface, see *Configuring ISDN Logical Interface Properties*.

E1 and T1 time slots unused by ISDN PRI can operate normally as DS0 interfaces. PRI B-channels run at 64 Kbps, but do not support the 56-Kbps line rate.

For more information about Channelized E1 PIMs, ISDN PRI connectivity, and the ISDN features they support, see the *Junos OS Interfaces and Routing Configuration Guide*.

Channelized IQ and IQE Interfaces Properties

On channelized IQ and IQE interfaces, you can specify options that are globally applied to all interface types associated with channelized IQ and IQE interfaces. For example, **e1-options** statements that you include at the **[edit interfaces ce1-*fpc/pic/port*]** hierarchy level apply globally to all E1 and *N*xDS0 interfaces that you create by partitioning **ce1-*fpc/pic/port***. Likewise, **t3-options** statements that you include at the **[edit interfaces ct3-*fpc/pic/port*]** hierarchy level apply globally to all T1 and *N*xDS0 interfaces that you create by partitioning **ct3-*fpc/pic/port***.

You can also apply interface options at the channel level. For example, you can include **t1-options** statements at the **[edit interfaces t1-*fpc/pic/port* <:*channel*>]** hierarchy level, and **ds0-options** statements at the **[edit interfaces ds-0/1/1<:*channel*>]** hierarchy level.

Only a subset of the interface options is valid on each type of channelized IQ interface. You configure all HDLC information at the end-data channel level, not at the parent level. For example, configure HDLC information at the **[edit interfaces ds-*fpc/pic/port*<:*channel*>]** hierarchy level, not at the **[edit interfaces ct1-*fpc/pic/port*<:*channel*>]** hierarchy level.

Automatic Protection Switching (APS) is supported on channelized OC3, OC12, STM1, and STM4 IQ interfaces. To configure APS, include the **aps** statement with options at the **[edit interfaces *interface-name* sonet-options]** hierarchy level. For information about configuring APS, see *Configuring Basic Automatic Protect Switching*.

In interchassis and intrachassis redundant LSQ configurations that use MLPPP and SONET APS, you can inhibit a router from sending PPP termination-request messages to the remote host if the link PIC fails. To inhibit the router from sending PPP

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termination-request messages to the remote host if the link PIC fails, include the no-termination-request statement at the **[edit interfaces *interface-name* ppp-options]** hierarchy level.

The **no-termination-request** statement is supported only with MLPPP and SONET APS configurations and works with PPP, PPP over Frame Relay, and MLPPP interfaces only. The supported PIC types are as follows:

- Channelized OC48/STM16 IQE PICs
- Channelized OC12/STM4 IQ and IQE PICs
- Channelized OC3 IQ and IQE PICs
- Channelized STM1 IQ and IQE PICs

Channelized IQ and IQE interfaces do not support receive buckets or transmit buckets.

For channelized IQ and IQE interfaces, there are some limitations on where you place certain statements in the configuration. When you configure clocking, bit error rate testing (BERT), C-bit parity, and loopback statements on T3, T1, or DS0 channels, you must follow these guidelines:

- For T3 IQ interfaces, you can include the **loopback payload** statement at the **[edit interfaces ct3-*fpc/pic/port*]** and **[edit interfaces t3-*fpc/pic/port*:*channel*]** hierarchy levels. For T1 interfaces, you can include the **loopback payload** statement at the **[edit interfaces t1-*fpc/pic/port*:*channel*]** hierarchy level; it is ignored if included at the **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level. For *N*xDS0 interfaces, payload and remote loopback are the same. If you configure one, the other is ignored. *N*xDS0 IQ interfaces do not support local loopback.
- If you include clocking, BERT, and C-bit parity configurations at both the **[edit interfaces ct3-*fpc/pic/port*<:*channel*> t3-options]** and **[edit interfaces t3-*fpc/pic/port*<:*channel*> t3-options]** hierarchy levels, the channelized T3-level statements are valid, and the T3-level statements are ignored.
- If you include clocking, BERT, and C-bit parity configurations at both the **[edit interfaces ct3-*fpc/pic/port*<:*channel*> t3-options]** and **[edit interfaces t1-*fpc/pic/port*<:*channel*> t1-options]** hierarchy levels, the channelized T3-level statements are operational for the T3 connections and the T1-level statements are operational for the T1 connections.
- Because DS0 channels do not have clocking capability, you must configure clocking at the **[edit interfaces ct1-*fpc/pic/port*<:*channel*> t1-options]** or **[edit interfaces ce1-*fpc/pic/port*<:*channel*> e1-options]** hierarchy level for channelized *N*xDS0 IQ interfaces.
- You can set BERT at the **[edit interfaces t3-*fpc/pic/port*<:*channel*> t3-options]** hierarchy level or on any partitioned channel of the channelized T3 interface. There are 12 BERT patterns available for *N*xDS0 channels and 28 BERT patterns for T1, channelized T1, T3, and channelized T3 interfaces within channelized IQ interfaces.
- For channelized IQ and IQE PICs, SONET/SDH level, use the **sonet-options loopback** statement **local** and **remote** options at the controller interface (coc48, cstm16, coc12,

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cstm4, coc3, cstm1). It is ignored for path-level interfaces **so-*fpc/pic/port*** or **so-*fpc/pic/port*:*channel***.

- For channelized interfaces that use Frame Relay encapsulation, the number of configurable DLCIs varies by channelized interface type.
- For channelized interfaces, you can configure class of service (CoS) on channels, but not at the controller level.
- For original Channelized OC12 PICs, limited CoS functionality is supported. For more information, contact Juniper Networks customer support.
- CoS is not configurable on controller interfaces.

NOTE: On Channelized SONET/SDH PICs, if you set the parent (or the master) controller clock to external, then you must set the child controller clocks to the default value—that is, internal.

For example, on the Channelized STM1 PIC, if the clock on the Channelized STM1 interface (which is the master controller) is set to external, then you must not configure the CE1 interface (which is the child controller) clock to external. Instead you must configure the CE1 interface clock to internal.

Related Documentation

- *SONET/SDH Physical Interface Properties Overview*

Structure of Channelized IQ and Channelized IQE PICs

Figure 1 on page 17 through Figure 13 on page 22 show the structural organization of the channelized PICs, channelized IQ PICs, and channelized IQE PICs. Table 10 on page 23 through Table 12 on page 25 show the structure of channelized IQE PICs, channelized IQ PICs, and channelized PICs.

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Figure 1: Channelized OC48/STM16 IQE PIC (in SONET Mode)

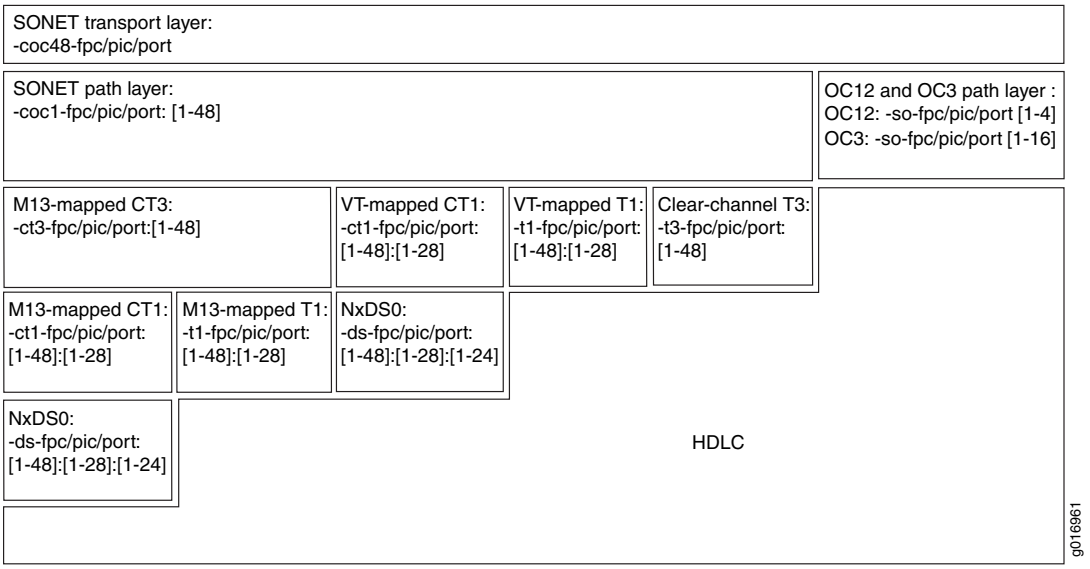

Figure 2: Channelized OC48/STM16 IQE PIC (in SDH Mode)

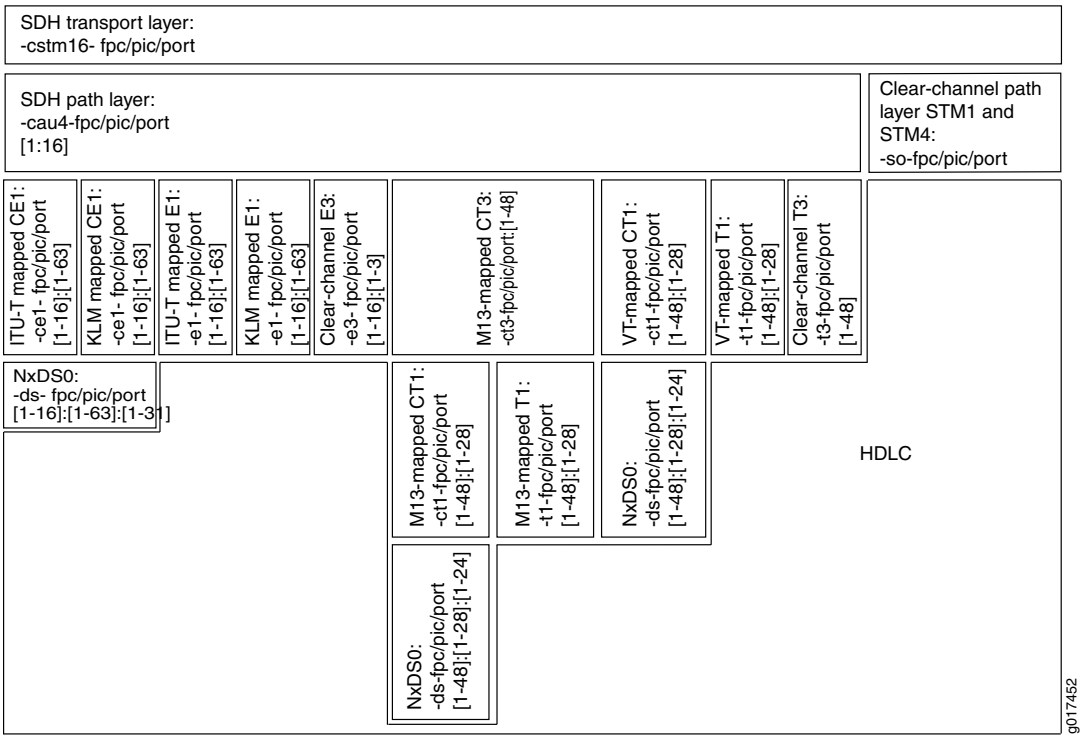

Figure 3: Channelized OC12 IQ PIC and Channelized OC12/STM4 IQE PIC (in SONET Mode)

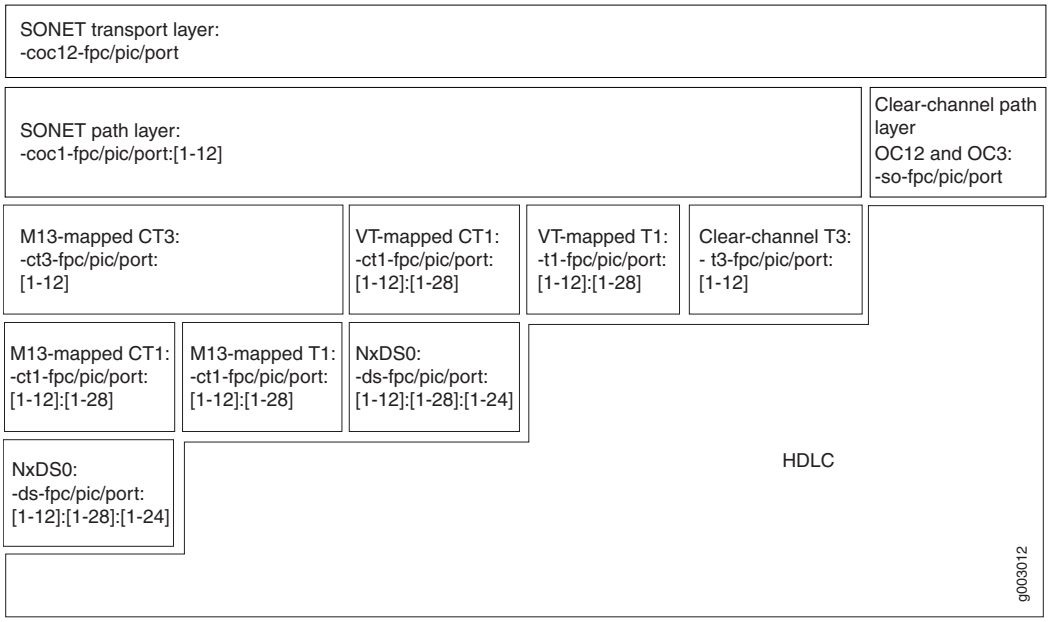

Figure 4: Channelized OC12/STM4 IQE PIC (in SDH Mode)

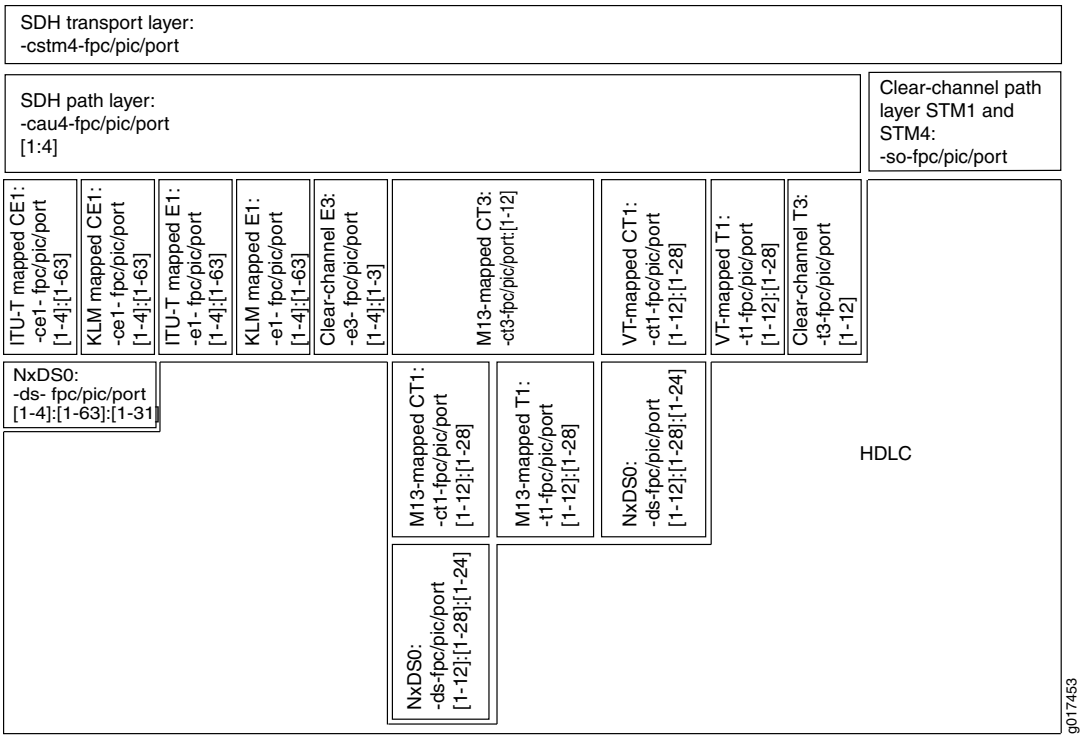

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Figure 5: Channelized OC12/STM4 IQ PIC (in SDH Mode)

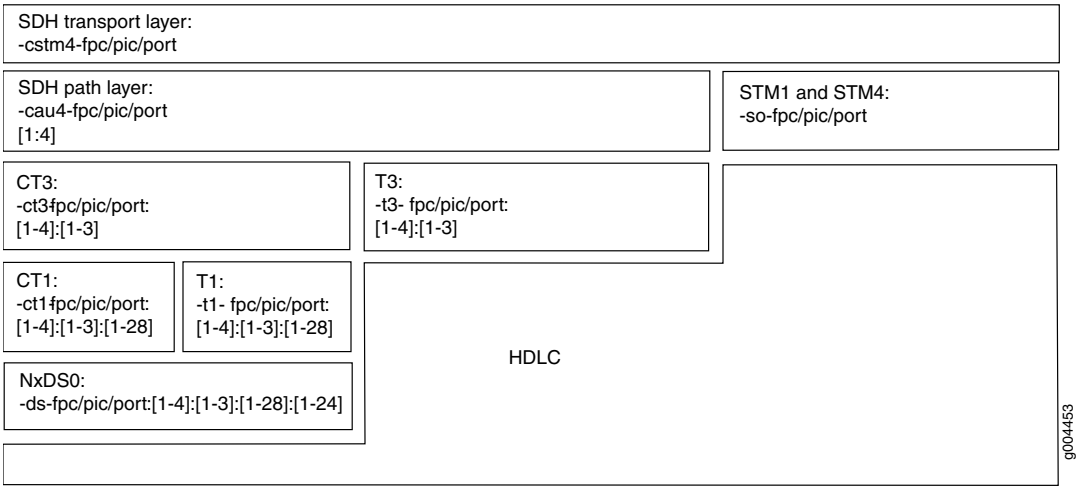

Figure 6: Channelized OC3 Ports (in SONET Mode) on Channelized OC3 IQ and Channelized OC3/STM1 IQE PICs

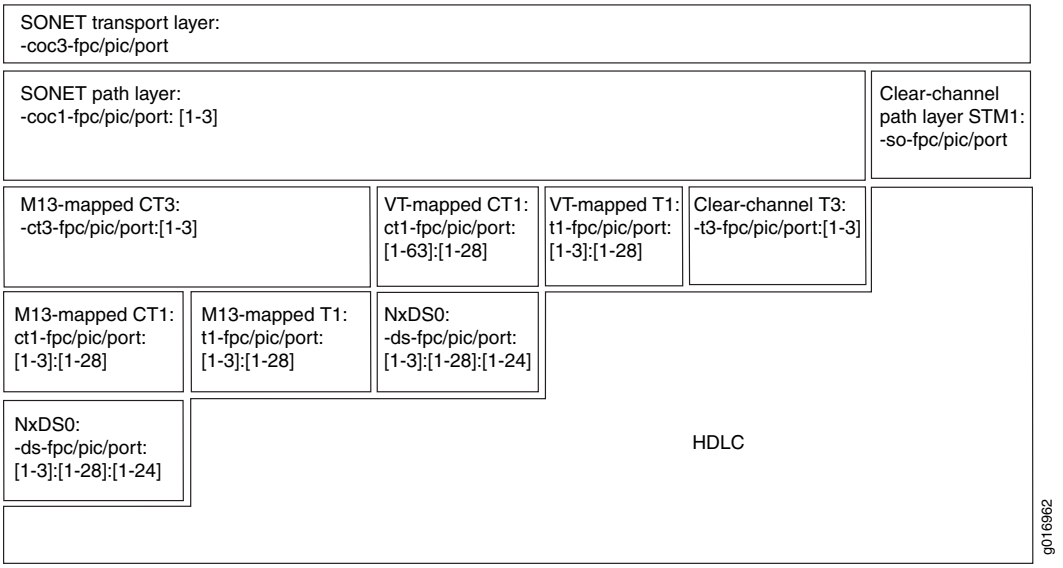

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Figure 7: Channelized CSTM1 Ports (in SDH Mode) on Channelized OC3/STM1 IQE PIC

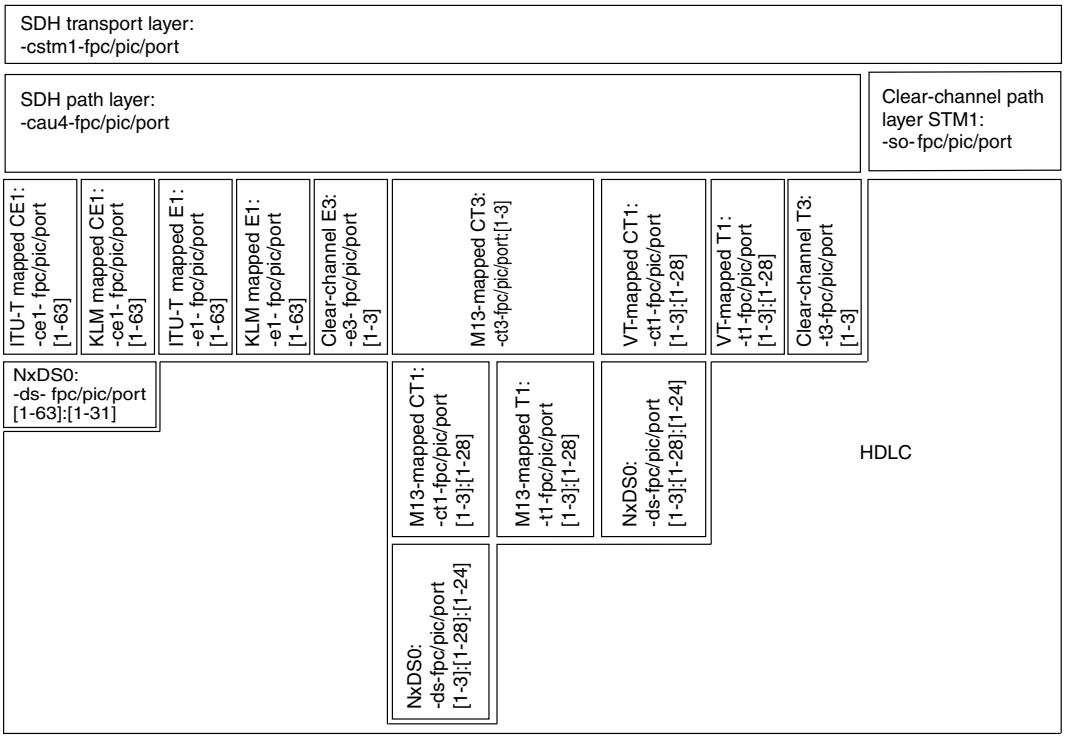

Figure 8: Channelized STM1 IQ PIC

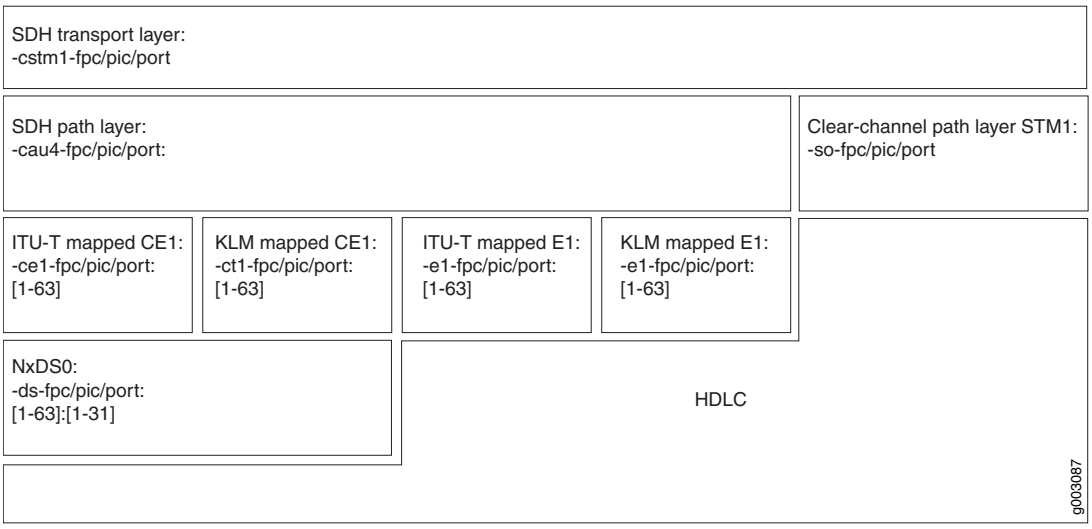

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Figure 9: Channelized CDS3/E3 IQE PIC (in DS3 Mode)

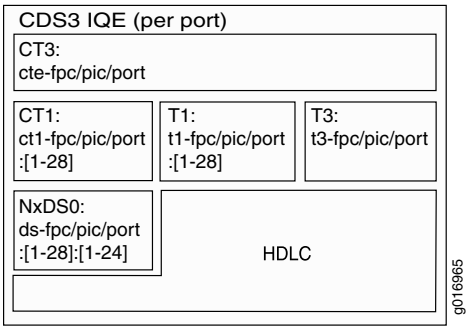

Figure 10: Channelized CDS3/E3 IQE PIC (in E3 Mode)

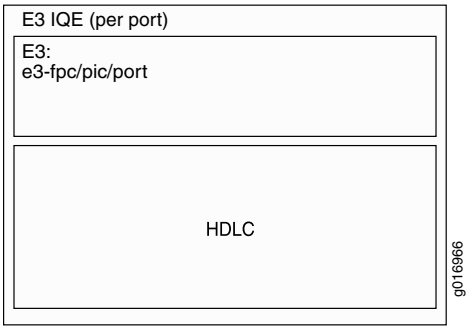

Figure 11: Channelized DS3 IQ PIC

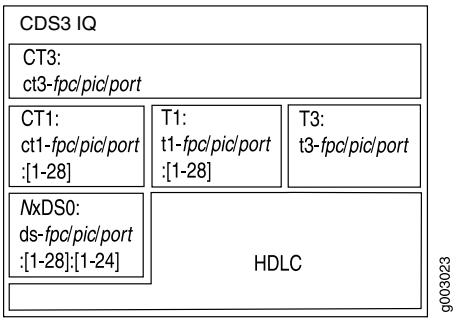

Figure 12: Channelized T1 IQ and IQE PIC

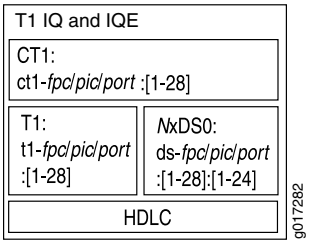

Figure 13: Channelized E1 IQ and IQE PIC

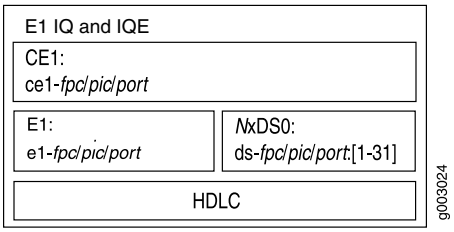

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Table 10: Structural Differences: Channelized IQE PICs

PIC Type	Transport	Path	DS3	DS1/E1	E3
Channelized IQE PICs					
Channelized OC48/STM16 IQE (SONET Mode)	coc48-*fpc/pic/port*	coc1-*fpc/pic/port*:[1-48] so-*fpc/pic/port*	ct3-*fpc/pic/port*:[1-48] t3-*fpc/pic/port*:[1-48]	ct1-*fpc/pic/port*:[1-48]:[1-28] t1-*fpc/pic/port*:[1-48]:[1-28]	Not applicable.
Channelized OC48/STM16 IQE (SDH Mode)	cstm16-*fpc/pic/port*	cau4-*fpc/pic/port*:[1-16] so-*fpc/pic/port*	ct3-*fpc/pic/port*:[1:16][1:3] t3-*fpc/pic/port*:[1:16][1:3] ct1-*fpc/pic/port*:[1:16]:[1-84] t1-*fpc/pic/port*:[1:16]:[1-84]	ce1-*fpc/pic/port*:[1-16]:[1-63] e1-*fpc/pic/port*:[1-16]:[1-63] ct1-*fpc/pic/port*:[1:16]:[1-3]:[1-28] t1-*fpc/pic/port*:[1:16]:[1-3]:[1-28]	e3-*fpc/pic/port*:[1-16]:[1-3]
Channelized OC12 IQE (SONET Mode)	coc12-*fpc/pic/port*	coc1-*fpc/pic/port*:[1-12] so-*fpc/pic/port*	ct3-*fpc/pic/port*:[1-12] t3-*fpc/pic/port*:[1-12]	ct1-*fpc/pic/port*:[1-12]:[1-28] t1-*fpc/pic/port*:[1-12]:[1-28]	Not applicable.
Channelized STM4 IQE (SDH Mode)	cstm4-*fpc/pic/port*	cau4-*fpc/pic/port*:[1-4] so-*fpc/pic/port*	ct3-*fpc/pic/port*:[1-4]:[1–3] t3-*fpc/pic/port*:[1-4]:[1–3] ct1-*fpc/pic/port*:[1-4]:[1-84] t1-*fpc/pic/port*:[1–4]:[1-84]	ce1-*fpc/pic/port*:[1-4]:[1-63] e1-*fpc/pic/port*:[1-4]:[1-63] ct1-*fpc/pic/port*:[1-4]:[1–3]:[1-28] t1-*fpc/pic/port*:[1-4]:[1–3]:[1-28]	e3-*fpc/pic/port*:[1-4]:[1:3]
Channelized OC3 IQE (SONET)	coc3-*fpc/pic/port*	coc1-*fpc/pic/port*:[1-3] so-*fpc/pic/port*	ct3-*fpc/pic/port*:[1-3] t3-*fpc/pic/port*:[1-3]	ct1-*fpc/pic/port*:[1-3]:[1-28] t1-*fpc/pic/port*:[1-3]:[1-28]	Not applicable.
Channelized STM1 IQE	cstm1-*fpc/pic/port*	cau4-*fpc/pic/port* so-*fpc/pic/port*	ct3-*fpc/pic/port*:[1-3] t3-*fpc/pic/port*:[1-3] ct1-*fpc/pic/port*:[1-84] t1-*fpc/pic/port*:[1-84]	ce1-*fpc/pic/port*:[1-63] e1-*fpc/pic/port*:[1-63] ct1-*fpc/pic/port*:[1-3]:[1-28] t1-*fpc/pic/port*:[1-3]:[1-28]	e3-*fpc/pic/port*:[1:3]]

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Table 10: Structural Differences: Channelized IQE PICs *(continued)*

PIC Type	Transport	Path	DS3	DS1/E1	E3
Channelized DS3 IQE	Not applicable.	Not applicable.	**ct3-*fpc/pic/port*** **t3-*fpc/pic/port***	**ct1-*fpc/pic/port*** **:[1-28]** **t1-*fpc/pic/port*** **:[1-28]**	Not applicable.
Channelized E3 IQE	Not applicable.	Not applicable.	Not applicable.	Not applicable.	**e3-*fpc/pic/port*** **:[1:4]**
Channelized T1 IQE	Not applicable.	Not applicable.	Not applicable.	**ct1-*fpc/pic/port*** **t1-*fpc/pic/port***	Not applicable.
Channelized E1 IQE	Not applicable.	Not applicable.	Not applicable.	**ce1-*fpc/pic/port*** **e1-*fpc/pic/port***	Not applicable.

Table 11: Structural Differences: Channelized IQ PICs

PIC Type	Transport	Path	DS3	DS1/E1	E3
Channelized IQ PICs					
Channelized OC12/STM4 IQ (SONET Mode)	**coc12-*fpc/pic/port***	**coc1-*fpc/pic/port*** **:[1-12]** **so-*fpc/pic/port***	**ct3-*fpc/pic/port*** **:[1-4]:[1-3]** **t3-*fpc/pic/port*** **:[1-4]:[1-3]**	**ct1-*fpc/pic/port*** **:[1-3]:[1-28]** **ct1-*fpc/pic/port*** **:[1-4]:[1-3]:[1-28]**	Not applicable.
Channelized OC12/STM4 IQ (SDH Mode)	**cstm4-*fpc/pic/port***	**cau4-*fpc/pic/port*:[1-4]** **so-*fpc/pic/port***	**ct3-*fpc/pic/port*** **:[1-4]:[1-3]** **t3-*fpc/pic/port*** **:[1-4]:[1-3]**	**ct1-*fpc/pic/port*** **:[1-3]:[1-28]** **t1-*fpc/pic/port*** **:[1-4]:[1-3]:[1-28]**	Not applicable.
Channelized OC3 IQ (SONET)	**coc3-*fpc/pic/port***	**coc1-*fpc/pic/port*** **:[1-3]** **so-*fpc/pic/port***	**ct3-*fpc/pic/port*** **:[1-3]** **t3-*fpc/pic/port*** **:[1-3]**	**ct1-*fpc/pic/port*** **:[1-3]:[1-28]** **t1-*fpc/pic/port*** **:[1-3]:[1-28]**	Not applicable.
Channelized STM1 IQ (SDH)	Not applicable.	**cau4-*fpc/pic/port*** **so-*fpc/pic/port***	Not applicable.	**ce1-*fpc/pic/port*** **:[1-63]** **e1-*fpc/pic/port*** **:[1-63]**	Not applicable.
Channelized DS3 IQ	Not applicable.	Not applicable.	**ct3-*fpc/pic/port*** **t3-*fpc/pic/port***	**ct1-*fpc/pic/port*** **:[1-28]** **t1-*fpc/pic/port*** **:[1-28]**	Not applicable.

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Table 11: Structural Differences: Channelized IQ PICs *(continued)*

PIC Type	Transport	Path	DS3	DS1/E1	E3
Channelized E1 IQ	Not applicable.	Not applicable.	Not applicable.	**ce1-*fpc/pic/port*** **e1-*fpc/pic/port***	Not applicable.

Table 12: Structural Differences: Channelized PICs

PIC Type	Transport	Path	DS3	DS1/E1	E3
Channelized PICs					
Channelized OC12	**t3-*fpc/pic/port*:0**	**t3-*fpc/pic/port*:[0-11]**	**t3-*fpc/pic/port*:[0-11]**	Not applicable.	Not applicable.
Channelized STM1	**e1-*fpc/pic/port*:0**	**e1-*fpc/pic/port*:0**	Not applicable.	**e1-*fpc/pic/port*:[0-63]**	Not applicable.
Channelized T3 and Multichannel T3	Not applicable.	Not applicable.	**t1-*fpc/pic/port*:0**	**t1-*fpc/pic/port*:[0-27]**	Not applicable.
Channelized E1	Not applicable.	Not applicable.	Not applicable.	**e1-*fpc/pic/port*** **ds-*fpc/pic/port*:0**	Not applicable.

Related Documentation

- Overview of Channelized IQ Interfaces on page 38

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PART 2

Configuring Channelized Interfaces

- Configuring Channelized E1 Interfaces on page 29
- Configuring Channelized IQ Interfaces on page 37
- Configuring Channelized E1 PRI and T1 PRI Interfaces on page 115
- Configuring Channelized OC3 IQ and IQE Interfaces on page 123
- Configuring Channelized OC12/STM4 Interfaces on page 133
- Configuring Channelized OC48/STM16 IQE Interfaces on page 165
- Configuring Channelized STM1 Interfaces on page 183
- Configuring Channelized T1 Interfaces on page 201
- Configuring Channelized T3 Interfaces on page 207

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CHAPTER 2

Configuring Channelized E1 Interfaces

- Channelized E1 IQ and IQE Interfaces Overview on page 29
- Configuring Channelized E1 Interfaces on page 29
- Example: Configuring Channelized E1 Interfaces on page 32
- Configuring Channelized E1 IQ and IQE Interfaces on page 33
- Example: Configuring Channelized E1 IQ or IQE Interfaces on page 34

Channelized E1 IQ and IQE Interfaces Overview

Each Channelized E1 PIC, Channelized E1 Intelligent Queuing (IQ) PIC and Channelized E1 Enhanced Intelligent Queuing (IQE) PIC has 10 E1 ports that you can channelize to the ***N*xDS0** level. Each E1 interface has 32 time slots (DS0), in which time slot 0 is reserved. You can combine one or more of these DS0 time slots (channels) to create a channel group ***N*xDS0**.

Related Documentation

- Example: Channelized E1 IQ Interface Configuration on page 107
- Channelized Interface Capabilities on page 4

Configuring Channelized E1 Interfaces

By default, all the time slots on a channelized E1 interface are used. There can be a maximum of 24 channel groups per channelized E1 interface. Thus, you can configure a maximum of 240 channel groups per PIC.

To specify the DS0 channel group number in the interface name, include a colon (:) as a separator. For example, a Channelized E1 PIC might have the following physical and virtual interfaces:

ds-0/0/0:*x*

where ***x*** is a DS0 channel group from 0 through 23 (for more information about ranges, see Table 13 on page 30).

You can use any of the values within the range available for ***x***; you do not have to configure the links sequentially. In addition, the Junos OS applies the interface options you configure according to the following rules:

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- To configure the **e1-options** statement, you must set channel group ***x*** to **0**:

  ds-0/0/0:0

- There are no restrictions on configuring the **ds0-options** statement.
- If you delete a configuration you previously committed for channel group 0, the options return to default values.

To configure the channel groups and time slots for a channelized E1 interface, include the following statements at the **[edit chassis]** hierarchy level:

```
[edit chassis]
fpc slot-number {
  pic pic-number {
    ce1 {
      e1 link-number {
        channel-group group-number;
        timeslots time-slot-range;
      }
    }
  }
}
```

NOTE: If you commit the interface name but do not include the **[edit chassis]** configuration, the Channelized E1 PIC behaves like a standard E1 PIC, and none of the DS0 functionality is accessible.

There are 32 time slots on an E1 interface; however, time slot 0 is reserved. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces.

Table 13 on page 30 shows the ranges you can specify.

Table 13: Ranges for Channelized E1 Configuration

Item	Option	Range
FPC slot	***slot-number***	0 through 7 (see note below)
PIC slot	***pic-number***	0 through 3
E1 link	***link-number***	0 through 9
DS0 channel group	***group-number***	0 through 23
Time slot	***time-slot-range***	0 through 31 (with time slot 0 reserved) (see note below)

The theoretical maximum number of channel groups possible per PIC is 10 * 24 = 240. This is within the maximum bandwidth available.

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NOTE: *N*xDS0 time slots configured on either a channelized STM1 IQ or IQE interface or channelized E1 IQ or IQE interface are numbered from 1 to 31 (0 is reserved), while fractional E1 time slots range from 2 to 32 (1 is reserved).

The FPC slot range depends on the router. For a routing matrix, the range is from 0 through 31. For M40, M40e, M160, M320, M120, and other T Series routers, the range is from 0 through 7. For M20 routers, the range is from 0 through 3. For M10 and M10i routers, the range is from 0 through 1. For M5 and M7i routers, the only applicable value is 0.

Configuring Channelized E1 Interface Properties

To configure channelized E1 interface properties, include the **e1-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
e1-options {
  fcs (16 | 32);
  framing (g704 | g704-no-crc4 | unframed);
  idle-cycle-flag (flags | ones);
  loopback (local | remote);
  start-end-flag (filler | shared);
}
```

To specify options for each of the DS0 channels, include the **ds0-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
ds0-options {
  byte-encoding (nx56 | nx64);
  fcs (16 | 32);
  idle-cycle-flag (flags | ones);
  loopback payload;
  start-end-flag (filler | shared);
}
```

For DS0 channels on a channelized E1 interface, the **clocking** statement is supported only for channel 0; it is ignored if included in the configuration of channels 1 through 11. The clock source configured for channel 0 applies to all channels on the channelized E1 interface. The individual DS0 channels use a gapped 45-MHz clock as the transmit clock. When you configure the clock source for a channelized interface—**ds-*fpc/pic/port*:0**, for example—you must also include the **channel-group** statement at the **[edit chassis]** hierarchy level, and specify channel group 0. For more information, see "Clock Sources on Channelized Interfaces" on page 8.

Only a subset of the E1 options is valid for the channelized configuration; you specify the time slots using the **[edit chassis]** configuration described in *Examples: Interface Naming*. For more information about the E1 and DS0 options, see *E1 Interfaces OverviewE1 Interfaces Overview* and *T1 Interfaces Overview*.

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Each E1 interface has 32 time slots (DS0s), in which time slot 0 is reserved. You can combine one or more of these DS0 time slots (channels) to create a channel group (*N*xDS0). There can be a maximum of 24 channel groups per E1 interface.

Example: Configuring Channelized E1 Interfaces

The following configuration is sufficient to get the channelized E1 interface up and running:

Configuring an E1 Interface, E1 Options, and DS0 Options

```
[edit chassis]
fpc 0 {
  pic 1 {
    ce1 {
      e1 0 {
        channel-group 0 timeslots 1;
        channel-group 1 timeslots 2;
        channel-group 5 timeslots 5-7;
      }
      e1 4 {
        channel-group 10 timeslots 11,17,28-31;
      }
    }
  }
}
[edit interfaces ds-0/1/0:0]
e1-options {
  fcs 32;
  framing g704-non-grc;
  loopback remote;
}
[edit interfaces ds-0/1/4:10]
ds0-options {
  byte-encoding nx56;
  start-end-flag filler;
}
```

The above configuration results in the following interfaces:

ds-0/1/0:1, with time slot 1 allocated
ds-0/1/0:5, with time slots 5 through 7 allocated
ds-0/1/4:10, with time slots 11, 17, and 28 through 31 allocated

The remaining ports (other than 0 and 4) remain as regular E1 interfaces (and follow the **e1-0/1/*x*** naming convention).

```
[edit chassis]
fpc 0 {
  pic 1 {
    ce1 {
      e1 0 {
        channel-group 1 timeslots 1;
        channel-group 5 timeslots 5-7;
      }
      e1 4 {
        channel-group 10 timeslots 11,17, 28-31;
      }
    }
```


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```
    }
}
```

Use Time Slots 1 Through 10

```
[edit chassis fpc slot-number pic pic-number ce1 e1 link-number]
channel-group group-number;
timeslots 1-10;
```

Use Time Slots 1 Through 5, 10, and 24

```
[edit chassis fpc slot-number pic pic-number ce1 e1 link-number]
channel-group group-number;
timeslots 1-5,10,24;
```

Related Documentation

- Configuring Channelized E1 Interfaces on page 29

Configuring Channelized E1 IQ and IQE Interfaces

- Configuring E1 IQ and IQE Interfaces on page 33
- Configuring Fractional E1 IQ and IQE Interfaces on page 33
- Configuring NxDS0 IQ and IQE Interfaces on page 34

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ and IQE interfaces. You can only apply CoS rules to the aggregate bit streams.

Configuring E1 IQ and IQE Interfaces

To configure an E1 interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces ce1-*fpc/pic/port*]** hierarchy level:

```
[edit interfaces ce1-fpc/pic/port]
no-partition interface-type e1;
```

This configuration creates interface **e1-*fpc/pic/port***.

Configuring Fractional E1 IQ and IQE Interfaces

By default, all the time slots on a channelized E1 interface are used. To configure a fractional E1 interface on a Channelized E1 IQ PIC, perform the following tasks:

1. Include the **no-partition** statement at the **[edit interfaces ce1-*fpc/pic/port*]** hierarchy level:

   ```
   [edit interfaces ce1-fpc/pic/port]
   no-partition interface-type e1;
   ```

   This configuration creates interface **e1-*fpc/pic/port***.

2. Configure the number of time slots allocated to the E1 IQ or IQE interface by including the **timeslots** statement at the **[edit interfaces e1-*fpc/pic/port* e1-options]** hierarchy level:

   ```
   [edit interfaces e1-fpc/pic/port e1-options]
   timeslots time-slot-range;
   ```

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*N*xDS0 time slots configured on either a channelized STM1 IQ or IQE interface or a channelized E1 IQ or IQE interface are numbered from 1 to 31 (0 is reserved), while fractional E1 time slots are numbered from 2 to 32 (1 is reserved).

To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces.

For more information about E1 time slots, see *Configuring Fractional E1 Time Slots*.

Example: Configuring Fractional E1 IQ and IQE Interfaces

Configure a fractional E1 interface that uses time slots 2 through 10:

```
[edit interfaces ce1-0/0/0]
no-partition interface-type e1;
[edit interfaces e1-0/0/0 e1-options]
timeslots 2-10;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring NxDS0 IQ and IQE Interfaces

By default, all the time slots on a channelized E1 interface are used. To configure an *N*xDS0 IQ interface on a Channelized E1 IQ or IQE PIC, you must configure the number of time slots allocated to the *N*xDS0 IQ or IQE interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces ce1-*fpc/pic/port*]** hierarchy level, specifying the **ds** interface type:

```
[edit interfaces ce1-fpc/pic/port]
partition partition-number timeslots time-slot-range interface-type ds;
```

For channelized E1 IQ and IQE interfaces, the partition number range is from 1 through 31.

For E1 IQ and IQE interfaces (**e1-*fpc/pic/port***), the time-slot range is from 2 through 31. For channelized E1 IQ and IQE interfaces (**ce1-*fpc/pic/port***), the time-slot range is from 1 through 31. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces. For more information about E1 time slots, see *Configuring Fractional E1 Time Slots*.

Example: Configuring an NxDS0 IQ or IQE Interface

Configure an *N*xDS0 interface that uses time slots 2 through 10. This configuration creates the **ds-0/0/0:1:1** interface.

```
[edit interfaces ce1-0/0/0:1]
partition 1 timeslots 2-10 interface-type ds;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Example: Configuring Channelized E1 IQ or IQE Interfaces

Configure a channelized E1 interface as an unpartitioned, clear channel:

Configuring an E1 Interface

```
[edit interfaces]
ce1-2/0/0 {
    no-partition interface-type e1; # e1-2/0/0
```


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```
}
```

The following configuration is sufficient to get the channelized E1 IQ or IQE interface up and running:

Configuring Multiple Interface Types

```
[edit]
interfaces {
  ce1-1/2/3 {
    partition 1 timeslots 10 interface-type ds; # ds-1/2/3:1
    partition 2 timeslots 1-9 interface-type ds; # ds-1/2/3:2
  }
  ds-1/2/3:1 {
    unit 0 {
      family inet {
        address 10.25.1.2/24;
      }
    }
  }
  ds-1/2/3:2 {
    unit 0 {
      family inet {
        address 10.25.2.2/24;
      }
    }
  }
}
[edit]
interfaces {
  ce1-1/2/6 {
    no-partition interface-type e1; # e1-1/2/6
  }
  e1-1/2/6 {
    e1-options {
      timeslots 1-2;
    }
    unit 0 {
      family inet {
        address 10.255.126.2/24;
      }
    }
  }
}
```

Related Documentation

- Configuring Channelized E1 IQ and IQE Interfaces on page 33

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CHAPTER 3

Configuring Channelized IQ Interfaces

- Overview of Channelized IQ Interfaces on page 38
- Guidelines for Configuring Channelized IQ Interfaces on page 39
- Frame Relay DLCI Limitations for Channelized IQ Interfaces on page 42
- System Requirements for Channelized IQ Interfaces on page 44
- Terms and Acronyms for Channelized IQ Interfaces on page 45
- Roadmap for Configuring Channelized IQ Interfaces on page 45
- Configuring a Clear Channel on a Channelized IQ Interface on page 45
- Configuring Single-Level Channels on a Channelized IQ Interface on page 46
- Configuring Multilevel Channels on a Channelized IQ Interface on page 47
- Configuring a Class-of-Service Scheduler Map on a Channelized IQ Interface on page 48
- Associating the Scheduler with a DLCI on a Channelized IQ Interface on page 49
- Scheduler Limitations for Channelized IQ Interfaces on page 49
- Verifying Class-of-Service Schedulers on Channelized IQ Interfaces on page 50
- Roadmap for Channelized IQ Interface Configuration Examples on page 51
- Merging Examples on page 51
- Example: OC12 Clear Channel on a Channelized OC12 IQ Interface on page 52
- Example: Complex Configuration for a Channelized OC12 IQ Interface on page 56
- Example: Converting a Channelized OC12 IQ PIC to a Channelized STM4 IQ Interface on page 77
- Example: Channelized OC3 IQ Interface Configuration on page 83
- Example: Channelized DS3 IQ Interface Configuration on page 90
- Example: Channelized T1 IQ Interface Configuration on page 96
- Example: Channelized STM1 IQ Interface Configuration on page 100
- Example: Channelized E1 IQ Interface Configuration on page 107
- Example: DLCI Class of Service on a Channelized IQ Interface Configuration on page 111

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Overview of Channelized IQ Interfaces

Channelized interfaces allow service providers to customize bandwidth to satisfy the needs of their customers. Whether the subscriber needs DS0, T1, fractional T1, E1, fractional E1, E3, T3, STM1, OC3, or OC12 service, a channelized interface can provide the necessary bandwidth today and can be reconfigured to support the customer's expanding network tomorrow. Standard channelized interfaces have been available on Juniper Networks routing platforms since JUNOS Release 3.4.

The original channelized interfaces for Juniper Networks M-series routers are available in the following models:

- 1-port Channelized OC12 PIC
- 10-port Channelized E1 PIC
- 1-port Channelized STM1 PIC
- 4-port Channelized DS3 PIC
- 1-port and 2-port multichannel Channelized DS3 PIC

These channelized interfaces provide a single level of channelization and require at both the **[edit chassis]** and the **[edit interfaces]** hierarchy levels. Most configuration options must be set on channel 0 and apply to all channels on these channelized interfaces.

The new channelized interfaces with intelligent queuing offer several advantages over the original channelized interfaces:

- Complete configuration tasks for channelized IQ interfaces are now centralized at the **[edit interfaces]** hierarchy level.
- Multiple levels of channelization are now possible with channelized IQ interfaces. For example, a channelized OC12 IQ interface can be divided into channelized OC1 interfaces, then subdivided into channelized T1 interfaces, and further split into *N*xDS0 channels.
- You can now configure interface statements, such as **clocking**, on individual channels rather than configuring them on channel 0 for all channels at the same hierarchy level.
- Class-of-service (CoS) processing now occurs on the PIC for channelized IQ interfaces rather than in the FPC.

The following M-series and T-series PICs support channelized interfaces with intelligent queuing:

- 1-port Channelized OC12 IQ PIC
- 1-port Channelized OC3 PIC
- 4-port Channelized DS3 IQ PIC
- 10-port Channelized T1 IQ PIC
- 10-port Channelized E1 IQ PIC
- 1-port Channelized STM1 IQ PIC

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To determine which PIC is installed, issue the **show chassis hardware** command:

```
user@RouterA> show chassis hardware
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                20070             M160
Midplane         REV 03   710-001245   AB4123
FPM CMB          REV 02   710-001642   AB3266
FPM Display      REV 02   710-001647   AB3038
CIP              REV 04   710-001593   AB3276
PEM 0            Rev 03   740-001243   KM28410           DC
PEM 1            Rev 03   740-001243   LF21558           Power Entry Module
PCG 0            REV 03   710-001568   AB3006
PCG 1            REV 02   710-001568   AB2992
Routing Engine 0                       20000005dfae3a01  RE-2.0
MCS 0            REV 04   710-001226   AB3208
MCS 1            REV 04   710-001226   AB3212
SFM 0 SPP        REV 06   710-001228   AB3103
SFM 0 SPR        REV 01   710-002189   AB2936            Internet Processor II
SFM 1 SPP        REV 07   710-001228   AG2634
SFM 1 SPR        REV 03   710-002189   AE3503            Internet Processor II
SFM 2 SPP        REV 06   710-001228   AB2976
SFM 2 SPR        REV 01   710-002189   AB2938            Internet Processor II
SFM 3 SPP        REV 06   710-001228   AB5826
SFM 3 SPR        REV 01   710-002189   AB2917            Internet Processor II
FPC 0            REV 03   710-003947   HE0614            E-FPC Type 1
  CPU            REV 01   710-004600   AT3217
 PIC 0     REV 03  750-005636  BE1826      4x CHDS3 IQ
```

This is the Channelized DS3 IQ PIC.

```
  PIC 1          REV 07   750-003846   HG5572            1x 800M Crypto
  PIC 2          REV 01   750-004507   BA5341            10x CE1-NxDS0
 PIC 3     REV 06  750-003009  AM6929      4x CT3
```

This is the original Channelized T3 PIC.

```
FPC 1            REV 03   710-003309   AD9434            E-FPC Type 2
  CPU            REV 05   710-001217   AH2707
  PIC 2          REV 05   750-001900   AD5738            1x OC-48 SONET, SMSR
  PIC 3          REV 04   750-003737   BC1106            4x G/E, 1000 BASE-SX
```

Related Documentation

- Roadmap for Configuring Channelized IQ Interfaces on page 45
- Roadmap for Channelized IQ Interface Configuration Examples on page 51

Guidelines for Configuring Channelized IQ Interfaces

When you configure channelized IQ interfaces, keep in mind these rules of thumb:

- You normally configure media-related statements and options at the physical interface level (also known as the controller level). This level is indicated by the **[edit interfaces *cxx-fpc/pic/port*]** hierarchy level.
- You should always configure HDLC-related statements (for example, **bytes**, **fcs**, **idle-cycle-flag**, **mtu**, **receive-bucket**, **start-end-flag**, and **transmit-bucket**) and logical

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interfaces (for example, **[edit interfaces *interface-name* unit *unit-number*]**) on end channels such as DS0 and T1. Never configure these statements at the controller level.

- Pay attention to the channel numbering rules:
  - OC3 data channels configured on channelized OC12 IQ interfaces are numbered from 1 to 4.
  - T3 channels configured on a channelized OC12 IQ or channelized OC3 IQ interface are numbered from 1 to 12.
  - T1 channels on a channelized OC12 IQ, channelized OC3 IQ, channelized DS3 IQ, or channelized T1 IQ interface are numbered from 1 to 28.
  - E1 channels configured on a channelized STM1 IQ interface are numbered from 1 to 63.
  - *N*xDS0 time slots configured on a channelized OC12 IQ, channelized OC3 IQ, channelized DS3 IQ, or channelized T1 IQ interface are numbered from 1 to 24.
  - *N*xDS0 time slots configured on either a channelized STM1 IQ interface or channelized E1 IQ interface are numbered from 2 to 32 (1 is reserved).
- You can configure Automatic Protection Switching (APS) on channelized OC12 IQ interfaces and Multiplex Section Protection (MSP) on channelized STM1 IQ interfaces. The JUNOS implementation of APS and MSP allows you to protect against circuit failures between a SONET/SDH add/drop multiplexer (ADM) and one or more routers, and between multiple interfaces in the same router. When a device fails, a backup device immediately takes over.

  You configure APS and MSP at the controller level only. To configure, include the **working-circuit** and **protect-circuit** statements at the **[edit interfaces coc12-*fpc/pic/port* sonet-options aps]** or **[edit interfaces coc3-*fpc/pic/port* sonet-options aps]** hierarchy level for APS and the **[edit interfaces cstm1-*fpc/pic/port* sonet-options aps]** hierarchy level for MSP.

  When you enable the controller-level interface as the working circuit, all partitions under the working circuit are also enabled. This is the default behavior even when APS or MSP is not configured. When the backup circuit interface is disabled, all partitions under this protected circuit are also disabled. If the working circuit fails, the interfaces are switched: The working circuit and all its partitions are disabled, and the protect circuit and all its partitions are enabled. You can verify this behavior by entering the **show interfaces controller** command. The disabled interfaces are shown as “admin down” and the enabled interfaces are shown as “admin up.”
- You can delete several channelized interfaces simultaneously by using a single command and regular expressions. To delete sequential channelized interfaces, issue the **wildcard** command with the **delete** option at the **[edit]** hierarchy level. Specify the hierarchy level and the channelized interfaces to be summarized with a regular expression. For example, to delete channelized interfaces in the range of **ds-0/0/0:0:0** through **ds-0/0/0:0:23**, issue the following command:

  user@router# **wildcard delete interfaces ds-0/0/0:0:.***

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- In JUNOS Release 6.2 and later, additional Frame Relay encapsulation types on physical interfaces and channels of channelized IQ interfaces are available:
  - Extended Frame Relay circuit cross-connect (CCC)—Allows you to assign any DLCI number from 1 to 1022 on Frame Relay CCC logical interfaces. To configure, include the **extended-frame-relay-ccc** statement at the **[edit interfaces *interface-name* encapsulation]** hierarchy level.
  - Extended Frame Relay translational cross-connect (TCC)—Allows you to assign any DLCI number from 1 to 1022 on Frame Relay TCC logical interfaces. To configure, include the **extended-frame-relay-tcc** statement at the **[edit interfaces *interface-name* encapsulation]** hierarchy level.
  - Flexible Frame Relay—Allows you to configure any DLCI number from 1 to 1022 and any combination of Frame Relay encapsulation types on logical interfaces. To configure, include the **flexible-frame-relay** statement at the **[edit interfaces *interface-name* encapsulation]** hierarchy level.
- When you configure clocking, bit error rate testing (BERT), C-bit parity, and loopback statements on T3, T1, or DS0 channels on channelized IQ interfaces, you must follow these guidelines:
  - If you include the statements at both the **[edit interfaces ct3-*fpc /pic/\port:channel* t3-options]** and **[edit interfaces t3-*fpc/pic/port:channel* t3-options]** hierarchy levels, channelized T3-level statements are operational and T3-level statements are ignored.
  - If you include the statements at both the **[edit interfaces ct3-*fpc/pic/port:channel* t3-options]** and **[edit interfaces t1-*fpc/pic/port:channel* t1-options]** hierarchy levels, the channelized T3-level statements are operational for the T3 connections and the T1-level statements are operational for the T1 connections.
  - Because DS0 channels do not have a valid clocking option, you must configure clocking for all *N*xDS0s at the **[edit interfaces ct1-*fpc/ pic/port:channel*t1-options]** hierarchy level.
  - You configure BERT at the **[edit interfaces ct3-*fpc/pic/port:channel* t3-options]** hierarchy level or on any partitioned subchannel of the channelized T3 interface. There are 12 BERT patterns available for DS0 channels and 28 BERT patterns for T1, channelized T1, T3, and channelized T3 channels within channelized IQ interfaces.
  - For Channelized OC3 IQ PICs, if you need a remote loopback on a far-end *N*xDS0 interface, and you are running a BERT test from the local *N*xDS0 interface, you must configure a remote loopback on the associated channelized T1 interface (**ct1**) for the far-end routing platform. To do this, include the **loopback remote** statement at the **[edit interfaces ct1-fpc/pic/port t1-options]** hierarchy level.
  - You can configure loopbacks at the **[edit interfaces ct3-*fpc/pic/port:channel* t3-options]** hierarchy level. Local loopbacks recirculate framing information within the local router. Remote loopbacks resend entire frames back to the remote sender.

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A new loopback called a *payload loopback* is similar to a remote loopback, but it resends only the data portion of a frame back to the remote sender.

- You can configure C-bit parity at the **[edit interfaces ct3-*fpc/ pic/port:channel* t3-options]** hierarchy level or on any partitioned subchannel of the channelized T3 interface.

- In JUNOS Release 7.5 and later, you can increase the delay buffer for E1, T1, and *N*xDS0 channels on all Channelized IQ PICs (except the Channelized OC12 IQ PIC) by including the **q-pic-large-buffer** statement at the **[edit chassis fpc *fpc-slot* pic *pic-slot*]** hierarchy level. By doing so, you enable the slower interfaces to handle bursts of traffic from faster upstream neighbors. As a result, any class-of-service (CoS) scheduler that you apply to an interface will inherit the larger delay buffer and the buffer is shared across all four CoS queues. For more information about increasing the delay buffer, see the *JUNOS Class of Service Configuration Guide*.

NOTE: If you configure the q-pic-large-buffer statement and APS in a multirouter topology, the Channelized IQ PIC resets and causes an APS switchover.

Related Documentation

- Overview of Channelized IQ Interfaces on page 38
- Roadmap for Configuring Channelized IQ Interfaces on page 45
- Roadmap for Channelized IQ Interface Configuration Examples on page 51

Frame Relay DLCI Limitations for Channelized IQ Interfaces

If you use Frame Relay encapsulation on a channelized interface, see Table 7 on page 8 for the maximum number of data-link connection identifiers (DLCIs) per channel that you can configure at each channel level for various channelized PICs.

NOTE: The actual number of DLCIs you can configure for each channel is determined by the capabilities of your system, such as the number and type of PICs installed. If the number of DLCIs in the configuration exceeds the capabilities of your system, the router might not be able to support the maximum DLCI values shown in Table 7 on page 8. To determine the capabilities of your system, contact Juniper Networks customer support.

Table 14: Frame Relay DLCI Limitations for Channelized Interfaces

Channelized PIC Type		
Original Channelized PICs	Number of DLCIs per Level	Range

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Table 14: Frame Relay DLCI Limitations for Channelized Interfaces *(continued)*

Channelized PIC Type		
T3 and T1 level channels	64 for regular mode 3 for sparse mode	0–63 for regular mode 1–1022 for sparse mode (0 is reserved for the Local Management Interface or LMI)
DS0 level channels	3 for sparse mode	1–1022 for sparse mode (0 is reserved for LMI)
Channelized IQ PICs	**Number of DLCIs per Level**	**Range**
OC12 level channels (Channelized OC12 IQ PIC)	64	1–1022 (0 is reserved for LMI)
OC3 level channels (Channelized OC12 IQ and Channelized OC3 IQ PICs)	64	1–1022 (0 is reserved for LMI)
T3 level channel (Channelized OC12 IQ, Channelized OC3 IQ, and Channelized DS3 IQ PICs)	256	1–1022 (0 is reserved for LMI)
STM1 level channel (Channelized STM1 IQ PIC)	64	1–1022 (0 is reserved for LMI)
E1 level channels (Channelized STM1 IQ and Channelized E1 IQ PICs)	64	1–1022 (0 is reserved for LMI)
T1 level channels (Channelized OC12 IQ, Channelized OC3 IQ, Channelized DS3 IQ, and Channelized T1 IQ PICs)	64	1–1022 (0 is reserved for LMI)
DS0 level channels (Channelized OC12 IQ, Channelized OC3 IQ, Channelized DS3 IQ, Channelized T1 IQ, Channelized STM1 IQ, and Channelized E1 IQ PICs)	16	1–1022 (0 is reserved for LMI)

Related Documentation

- Overview of Channelized IQ Interfaces on page 38
- Roadmap for Configuring Channelized IQ Interfaces on page 45
- Roadmap for Channelized IQ Interface Configuration Examples on page 51

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System Requirements for Channelized IQ Interfaces

To implement channelized IQ interfaces, your system must meet these requirements:

- JUNOS Release 8.0 or later for DLCI-level scheduler support on E1 channels configured on Channelized STM1 IQ PICs
- JUNOS Release 7.6 or later for converting a Channelized OC12 IQ PIC to a channelized STM4 SDH interface
- JUNOS Release 7.5 or later for increased delay buffers on channelized E1 IQ, channelized DS3 IQ, channelized OC3 IQ, channelized STM1 IQ, and channelized T1 IQ interfaces; support for rate limiting on physical interfaces; and support for channelized STM1 IQ interfaces on T-series platforms
- JUNOS Release 7.4 or later for channelized T1 IQ interfaces
- JUNOS Release 7.1 or later for channelized OC3 IQ interfaces
- JUNOS Release 6.3 or later for configuration of 256 DLCIs at the T3 channel level for channelized OC12 IQ interfaces
- JUNOS Release 6.2 or later for configuration of 64 DLCIs at the T1 channel level for channelized OC12 IQ interfaces, 64 DLCIs at the E1 channel level for channelized STM1 IQ interfaces, and 256 DLCIs at the T3 channel level for channelized DS3 IQ interfaces
- JUNOS Release 6.2 or later for configuration of flexible Frame Relay, extended Frame Relay CCC, and extended Frame Relay TCC encapsulation types
- JUNOS Release 6.2 or later for support of E3 IQ interfaces
- JUNOS Release 6.0 or later for logical interface-level class of service on channelized STM1 IQ interfaces, and APS/MSP on channelized OC12 IQ and channelized STM1 IQ interfaces
- JUNOS Release 5.7 or later for channelized STM1 IQ interfaces
- JUNOS Release 5.7 or later for logical interface-level class of service on the channelized DS3 IQ, channelized E1 IQ, and channelized OC12 IQ interfaces
- JUNOS Release 5.6 or later for channelized DS3 IQ, channelized E1 IQ, and channelized OC12 IQ interfaces
- Two Juniper Networks M-series or T-series routers equipped with an Enhanced Type 1 or Type 2 Flexible PIC Concentrator (FPC)

Related Documentation

- Overview of Channelized IQ Interfaces on page 38
- Roadmap for Configuring Channelized IQ Interfaces on page 45
- Roadmap for Channelized IQ Interface Configuration Examples on page 51

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Terms and Acronyms for Channelized IQ Interfaces

P

Performance Processor (QPP) ASIC A next-generation processor that provides enhanced capabilities for channelized IQ interfaces.

Roadmap for Configuring Channelized IQ Interfaces

To configure a channelized IQ interface, you must perform one or more of the following procedures:

- Configure a clear channel. A clear channel consolidates the entire bandwidth of a channelized interface into a single unpartitioned stream that looks like a standard interface. For example, a channelized OC12 IQ interface configured as a clear channel appears to have an OC12 SONET interface.

  See "Configuring a Clear Channel on a Channelized IQ Interface" on page 45.

- Configure single-level channels. By configuring single-level channels, you subdivide a channelized interface into a set of large end channels.

  See "Configuring Single-Level Channels on a Channelized IQ Interface" on page 46.

- Configure multilevel channels. You can subdivide a channelized interface and then split these subchannelized interfaces into end channels. Creating small end channels might require you to configure multilevel channels.

  See "Configuring Multilevel Channels on a Channelized IQ Interface" on page 47.

- Configure class of service. On channelized IQ interfaces, you can apply class of service at the logical interface level for Frame Relay data-link connection identifiers (DLCIs).

  See "Configuring a Class-of-Service Scheduler Map on a Channelized IQ Interface" on page 48.

Related Documentation

- Overview of Channelized IQ Interfaces on page 38
- Roadmap for Channelized IQ Interface Configuration Examples on page 51

Configuring a Clear Channel on a Channelized IQ Interface

A clear channel consolidates the entire bandwidth of a channelized interface into a single unpartitioned stream that looks like a standard interface. For example, a channelized OC12 IQ interface configured as a clear channel appears to have an OC12 SONET interface. To configure a clear channel on a channelized IQ interface, include the **no-partition** statement at the **[edit interfaces c*xx-fpc/pic/port*]** hierarchy level. Include the **interface-type** option to set the channelized interface type. Once the interface is established, you can configure it the same way as a regular interface.

```
[edit]
interfaces {
   coc12-1/1/0 {
```

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```
    no-partition interface-type so; # This creates a SONET OC12 interface:
  }
  so-1/1/0 {
    unit 0 {
      family inet {
        address 10.245.1.1/30;
      }
    }
  }
}
```

Related Documentation

- Overview of Channelized IQ Interfaces on page 38
- Roadmap for Configuring Channelized IQ Interfaces on page 45
- Roadmap for Channelized IQ Interface Configuration Examples on page 51

Configuring Single-Level Channels on a Channelized IQ Interface

You can subdivide a channelized interface directly into a set of large end channels. To configure part of a channelized IQ interface as a channel, include the **partition** statement at the **[edit interfaces c*xx-fpc/pic/port*]** hierarchy level. On a channelized OC12 IQ interface, use the **oc-slice** option to create slice sizes corresponding to the desired bandwidth. On a channelized E1 IQ interface, use the **timeslots** option to define *N*xDS0 channels or channel groups. On all channelized IQ interfaces, use the **interface-type** option to set the interface type (such as SONET OC3 or T3). Once the channel interfaces are established, you can configure them the same way as regular interfaces.

NOTE: One oc-slice in a channelized OC12 IQ interface partition is equivalent to one OC1/DS3-sized channel. If you add three slices together in sequence as a triplet, these pieces become an OC3-sized interface. However, you can configure triplets only with the following sequential slices: 1–3, 4–6, 7–9, 10–12.

```
[edit]
interfaces {
  coc12-0/0/0 {
    partition 1 oc-slice 1-3 interface-type so; # Creates an OC3 SONET
  }
  so-0/0/0:1 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.0.2/30;
      }
    }
  }
}
```

Related Documentation

- Roadmap for Configuring Channelized IQ Interfaces on page 45
- Overview of Channelized IQ Interfaces on page 38

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- Roadmap for Channelized IQ Interface Configuration Examples on page 51

Configuring Multilevel Channels on a Channelized IQ Interface

You can subdivide a channelized interface and then split these subchannelized interfaces into end channels. Creating small end channels might require multiple levels of channelization.

To configure a subdivided channelized interface within a partition of a channelized IQ interface, include the **partition** statement at the **[edit interfaces c*xx-fpc/pic/port*]** hierarchy level. On a channelized OC12 IQ interface, use the **oc-slice** option to create slice sizes corresponding to the desired bandwidth. On all channelized IQ interfaces, use the **interface-type** option to set the channelized interface type (such as channelized OC1).

On a channelized OC12 IQ interface, you can convert a subdivided channelized OC1 interface into a T3 or channelized T3 interface. To configure, include the **no-partition** statement at the **[edit interfaces coc1-*fpc/pic/port:channel*]** hierarchy level and set the **interface-type** to **ct3**. A **ct3-*fpc/pic/port:channel*** interface is the result. Such a conversion is known as M13 with C-bit parity mapping. T1 and DS0 channels created directly from a **coc-1** interface use VT mapping.

To further split your channelized interfaces into even smaller channelized interfaces, use the **partition** and **interface-type** statements at the **[edit interfaces c*xx-fpc/pic/port:channel*]** hierarchy level. You can create channelized OC1, channelized T3, and channelized T1 interfaces, depending on the PIC type.

Finally, you configure these “channels of channels” as end channels. To configure end channels on a segmented channelized IQ interface, include the **partition** statement at the [**edit interfaces c*xx-fpc/pic/port:channel***] hierarchy level. The number of channels in the hierarchy depends on how finely you partition the channelized IQ interface. Use the **timeslots** option to select *N*xDS0 level channels and the **interface-type** option to set the interface type (such as T1 or *N*xDS0). Once the resulting channels have been established, you can configure them as regular interfaces.

```
[edit]
interfaces {
   coc12-0/0/0 {
      partition 2 oc-slice 4 interface-type coc1; # Creates channelized OC1
      partition 3 oc-slice 5 interface-type coc1; # interfaces: coc1-0/0/0:2,
      partition 4 oc-slice 6 interface-type coc1; # :3, and :4.
   }
   coc1-0/0/0:2 {
      no-partition interface-type t3; # Converts a channelized OC1 to
   }
   t3-0/0/0:2 {
      encapsulation ppp;
      unit 0 {
         family inet {
            address 10.255.0.6/30;
         }
      }
```

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```
        coc1-0/0/0:3 {
          no-partition interface-type ct3; # Creates a channelized T3 interface:
        }
        ct3-0/0/0:3 {
          partition 1-28 interface-type t1; # Creates 28 T1 interfaces:
        }
        coc1-0/0/0:4 {
          partition 1 interface-type ct1; # Creates a channelized T1 interface:
        }
        ct1-0/0/0:4:1 {
          partition 1 timeslots 1 interface-type ds; # Creates a 1xDS0 interface:
          ...# ds-0/0/0:4:1:1.
          partition 24 timeslots 24 interface-type ds; # Creates a 1xDS0 interface:
        }
        t1-0/0/0:3:1 {
          encapsulation ppp;
          unit 0 {
            family inet {
              address 10.255.0.26/30;
            }
          }
        }
        ...
      }
      ds-0/0/0:4:1:24 {
        encapsulation ppp;
        unit 0 {
          family inet {
            address 10.255.0.214/30;
          }
        }
      }
    }
```

Related Documentation

- Overview of Channelized IQ Interfaces on page 38
- Roadmap for Configuring Channelized IQ Interfaces on page 45
- Roadmap for Channelized IQ Interface Configuration Examples on page 51

Configuring a Class-of-Service Scheduler Map on a Channelized IQ Interface

To configure a class-of-service scheduler map, include the **scheduler-map** statement at the **[edit class-of-service interfaces *interface-name* unit *logical-unit-number*]** hierarchy level.

To specify the amount of bandwidth allocated to the logical interface, you must also include the **shaping-rate** statement at the **[edit class-of-service interfaces *interface-name* unit *logical-unit-number*]** hierarchy level. You can specify a peak bandwidth rate in bits per second (bps), either as a complete decimal number or as a decimal number followed by the abbreviation **k** (1000), **m** (1,000,000), or **g** (1,000,000,000). The range is 1000 through 32,000,000,000 bps.

```
[edit]
```


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```
class-of-service {
  interfaces {
    interface-name {
      unit logical-unit-number {
        scheduler-map map-name;
        shaping-rate rate;
      }
    }
  }
}
```

If you do not include the **shaping-rate** statement in the configuration, the logical interface might not be able to transmit traffic unless surplus bandwidth is available on the physical interface. The sum of the bandwidth you allocate to all the logical interfaces on a physical interface should not exceed the bandwidth of the physical interface.

Related Documentation

- Overview of Channelized IQ Interfaces on page 38
- System Requirements for Channelized IQ Interfaces on page 44
- Example: DLCI Class of Service on a Channelized IQ Interface Configuration on page 111

Associating the Scheduler with a DLCI on a Channelized IQ Interface

For channelized OC12 IQ, channelized OC3 IQ, channelized DS3 IQ, channelized T1 IQ, channelized STM1 IQ, and channelized E1 IQ interfaces with Frame Relay encapsulation, you can associate a scheduler map name with a logical interface. To activate transmission scheduling on a DLCI, include the **per-unit-scheduler** statement at the **[edit interfaces *interface-name*]** hierarchy level.

```
[edit]
interfaces {
  interface-name {
    per-unit-scheduler;
  }
}
```

Related Documentation

- Overview of Channelized IQ Interfaces on page 38
- Roadmap for Configuring Channelized IQ Interfaces on page 45
- Example: DLCI Class of Service on a Channelized IQ Interface Configuration on page 111

Scheduler Limitations for Channelized IQ Interfaces

You can configure logical interface scheduling on up to 16 channelized interfaces per channelized IQ PIC. For channelized IQ interfaces, the number of schedulers you can apply varies by channel level. Table 15 on page 50 shows the number of schedulers you can apply at each channel level.

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Table 15: Scheduler Limitations for Channelized IQ Interfaces

Channelized IQ Interfaces	Number of Schedulable DLCIs per Level
Channelized OC12 IQ interfaces	63 for OC3 and OC12 channels, 255 for T3 channels
Channelized OC3 IQ interfaces	63 for OC3 channels, 255 for T3 channels, 63 for T1 channels
Channelized DS3 IQ interfaces	255 for T3 channels
Channelized T1 IQ interfaces	63 for T1 channels
Channelized STM1 IQ interfaces	63 for STM1 channels, 63 for E1 channels
Channelized E1 IQ interfaces	63 for E1 channels

You can associate up to four forwarding classes per physical interface. Keep in mind that you can configure either a physical interface scheduler or a logical interface scheduler, but not both on the same interface simultaneously.

If you use a Gigabit Ethernet IQ interface, you can apply schedulers on up to 768 VLANs per PIC. For more information on class of service for VLANs on a Gigabit Ethernet IQ interface, see the *JUNOS Network Interfaces Configuration Guide*.

Related Documentation

- Overview of Channelized IQ Interfaces on page 38
- Roadmap for Configuring Channelized IQ Interfaces on page 45
- Roadmap for Channelized IQ Interface Configuration Examples on page 51

Verifying Class-of-Service Schedulers on Channelized IQ Interfaces

Purpose To verify the correct operation of class-of-service schedulers on channelized IQ interfaces.

Action Verify the correct operation of class-of-service schedulers on channelized interfaces:

- **show class of service forwarding-table**
- **show class-of-service interface**

```
user@router> show class-of-service interface t3-3/1/0
Physical interface: t3-3/1/0, Index: 169
  Scheduler map: <default>, Index: 1
  Logical interface: t3-3/1/0.0, Index: 68
    Object         Name                   Type                        Index
    Scheduler-map  sched-0                                            11204
    Rewrite        exp-default            exp                            2
    Classifier     ipprec-compatibility   ip                             5
  Logical interface: t3-3/1/0.1, Index: 69
    Object         Name                   Type                        Index
    Scheduler-map  sched-1                                             7038
```


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```
Rewrite        exp-default            exp                          2
Classifier     ipprec-compatibility   ip                           5
```

Related Documentation

- Overview of Channelized IQ Interfaces on page 38
- Roadmap for Configuring Channelized IQ Interfaces on page 45
- Example: DLCI Class of Service on a Channelized IQ Interface Configuration on page 111

Roadmap for Channelized IQ Interface Configuration Examples

The following examples give typical topologies and configurations for some of the more common channelized IQ interface configurations:

- Example: OC12 Clear Channel on a Channelized OC12 IQ Interface on page 52
- Example: Complex Configuration for a Channelized OC12 IQ Interface on page 56
- Example: Converting a Channelized OC12 IQ PIC to a Channelized STM4 IQ Interface on page 77
- Example: Channelized OC3 IQ Interface Configuration on page 83
- Example: Channelized DS3 IQ Interface Configuration on page 90
- Example: Channelized T1 IQ Interface Configuration on page 96
- Example: Channelized STM1 IQ Interface Configuration on page 100
- Example: Channelized E1 IQ Interface Configuration on page 107
- Example: DLCI Class of Service on a Channelized IQ Interface Configuration on page 111

Related Documentation

- Overview of Channelized IQ Interfaces on page 38
- Roadmap for Configuring Channelized IQ Interfaces on page 45

Merging Examples

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

   For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

   ```
   system {
     scripts {
       commit {
         file ex-script.xsl;
       }
     }
   }
   ```

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```
interfaces {
   fxp0 {
      disable;
      unit 0 {
         family inet {
            address 10.0.0.1/24;
         }
      }
   }
}
```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

```
[edit]
user@host#load merge /var/tmp/ex-script.conf
load complete
```

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

   For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

```
commit {
   file ex-script-snippet.xsl; }
```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:

```
[edit]
user@host# edit system scripts
[edit system scripts]
```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

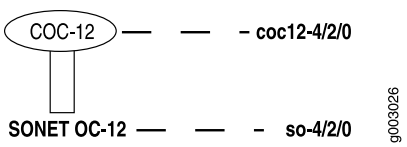
```
[edit system scripts]
user@host# load merge relative /var/tmp/ex-script-snippet.conf
load complete
```

Related Documentation

- For more information about the load command, see the *CLI User Guide*.

Example: OC12 Clear Channel on a Channelized OC12 IQ Interface

Figure 14: OC12 Clear Channel on a Channelized OC12 IQ Interface



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The key to this simple example is to remove all partitions from the channelized interface. To configure a clear channel on a channelized IQ interface, include the **no-partition** statement at the **[edit interfaces coc12-*fpc*/*pic*/0]** hierarchy level and select the interface type. After you commit this part of the configuration, the clear channel is set and you can configure the resulting SONET interface normally.

Router A

```
[edit]
interfaces {
  coc12-4/2/0 {
    no-partition interface-type so;
  }
  so-4/2/0 {
    unit 0 {
      family inet {
        address 10.245.1.1/30;
      }
    }
  }
}
```

Verifying Your Work

To verify correct operation of a channelized OC12 IQ interface configured as a clear channel, use the following commands:

- **show interfaces**
- **show interfaces controller**

To view the interface names of the physical channelized OC12 IQ interface and the clear channel OC12 interface configured on the channelized IQ interface, use the **show interfaces controller** command:

```
user@RouterA> show interfaces controller
Controller                                                      Admin Link
coc12-4/2/0                                                      up    up

# This is the physical channelized OC12 IQ interface.

so-4/2/0                                                         up    up

# This is the resulting SONET OC12 interface.
```

To view information about the physical channelized interface, include the **c*xx*-*fpc*/*pic*/0** option with the **show interfaces** command:

```
user@RouterA> show interfaces extensive coc12-4/2/0

Physical interface: coc12-4/2/0, Enabled, Physical link is Up
  Interface index: 74, SNMP ifIndex: 1269, Generation: 73
  Link-level type: Controller, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC12, Loopback: None,
  FCS: 16, Payload scrambler: Disabled, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  Last flapped   : 2002-10-09 10:56:45 PDT (05:14:39 ago)
```

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```
  Statistics last cleared: Never
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Bucket drops: 0, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    HS link FIFO overflows: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, HS link FIFO underflows: 0
  SONET alarms   : None
  SONET defects  : None
  SONET PHY:            Seconds        Count  State
    PLL Lock                  0            0  OK
    PHY Light                 0            0  OK
  SONET section:
    BIP-B1                   10           55
    SEF                       0            0  OK
    LOS                       0            0  OK
    LOF                       0            0  OK
    ES-S                     10
    SES-S                     0
    SEFS-S                    0
  SONET line:
    BIP-B2                   10          144
    REI-L                     0            0
    RDI-L                     3            1  OK
    AIS-L                     0            0  OK
    BERR-SF                   0            0  OK
    BERR-SD                   1            1  OK
    ES-L                     10
    SES-L                     0
    UAS-L                     0
    ES-LFE                    3
    SES-LFE                   3
    UAS-LFE                   0
  Received SONET overhead:
    F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
    S1      : 0x00
  Transmitted SONET overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00
```

To view information about the clear channel SONET interface, include the **so-*fpc/pic/0*** (interface name) option with the **show interfaces** command:

```
user@RouterA> show interfaces extensive so-4/2/0

Physical interface: so-4/2/0, Enabled, Physical link is Up
  Interface index: 261, SNMP ifIndex: 2000, Generation: 260
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode,
Speed: OC12, Loopback: None, FCS: 16,
  Payload scrambler: Enabled, Parent: coc12-4/2/0 (Index 74)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 37 (last seen 00:00:04 ago)
    Output: 36 (last sent 00:00:09 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls: Not-configured
  CHAP state: Not-configured
```

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```
  Last flapped   : 2002-10-09 16:04:18 PDT (00:07:26 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :             80461791              7435000 bps
   Output bytes  :             81637408              7502352 bps
   Input  packets:                34017                  275 pps
   Output packets:                34298                  278 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
Bucket drops: 0, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    HS link FIFO overflows: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, HS link FIFO underflows: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets
    0 best-effort               34129                34129                   0
    1 expedited-fo                  0                    0                   0
    2 assured-forw                  0                    0                   0
    3 network-cont                  0                    0                   0
  SONET alarms   : None
  SONET defects  : None
  SONET path:
    BIP-B3                    0            0
    REI-P                     0            0
    LOP-P                     0            0  OK
    AIS-P                     0            0  OK
    RDI-P                     0            0  OK
    UNEQ-P                    0            0  OK
    PLM-P                     0            0  OK
    ES-P                      0
    SES-P                     0
    UAS-P                     0
    ES-PFE                    0
    SES-PFE                   0
    UAS-PFE                   0
  Received SONET overhead:
    C2      : 0xcf, C2(cmp) : 0xcf, F2      : 0x00, Z3      : 0x00
    Z4      : 0x00, S1(cmp) : 0x00
  Transmitted SONET overhead:
    C2      : 0xcf, F2      : 0x00, Z3      : 0x00, Z4      : 0x00
  Received path trace: RouterB so-2/2/0
    61 72 6d 61 67 6e 61 63 20 73 6f 2d 32 2f 32 2f   RouterB so-2/2/0
    30 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 0d 0a      ...............
  Transmitted path trace: RouterA so-4/2/0
    74 69 6d 6d 65 73 73 71 75 61 72 65 20 73 6f 2d   RouterA so-4/2/0
    34 2f 32 2f 30 00 00 00 00 00 00 00 00 00 00 00   ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 0, Runt threshold: 0
  Packet Forwarding Engine configuration:
    Destination slot: 4, PLP byte: 4 (0x00)
    CoS transmit queue              Bandwidth           Buffer Priority   Limit
                              %          bps   %        bytes
    0 best-effort            95    590976000  95            0      low    none
    3 network-control         5     31104000   5            0      low    none
  Logical interface so-4/2/0.0 (Index 7) (SNMP ifIndex 2001) (Generation 12)
```

```
Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
Protocol inet, MTU: 4470, Generation: 18, Route table: 0
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.245.1.0/30, Local: 10.245.1.1, Broadcast: Unspecified, Generation: 21
```

Related Documentation

- Roadmap for Channelized IQ Interface Configuration Examples on page 51
- Roadmap for Configuring Channelized IQ Interfaces on page 45

Example: Complex Configuration for a Channelized OC12 IQ Interface

Figure 15: Complex Configuration for a Channelized OC12 IQ Interface

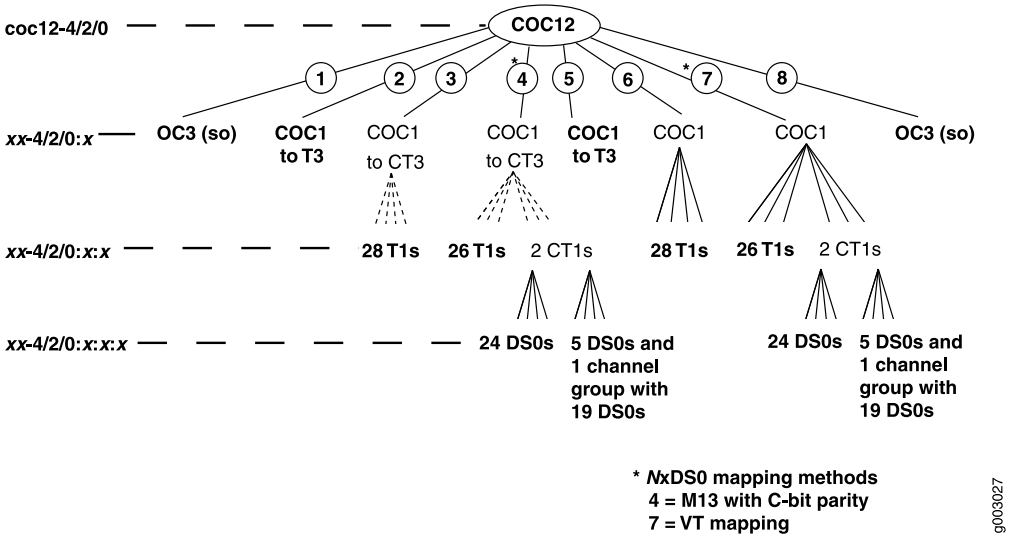

Table 16: Complex Channelization for a Channelized OC12 IQ Interface

Partition	Slices	Interface Type	Interface Level 2	Interface Level 3
1	1–3	OC3	–	–
2	4	Channelized OC1 converted to T3	–	–
3	5	Channelized OC1 converted to channelized T3	28 T1s	–
4	6	Channelized OC1 converted to channelized T3	26 T1s	–
–	–	–	2 CT1s	24 DS0s
–	–	–	–	5 DS0s and 1 channel group of 19 DS0s

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Table 16: Complex Channelization for a Channelized OC12 IQ Interface *(continued)*

Partition	Slices	Interface Type	Interface Level 2	Interface Level 3
5	7	Channelized OC1 converted to T3	–	–
6	8	Channelized OC1	28 T1s	–
7	9	Channelized OC1	26 T1s	–
–	–	–	2 CT1s	24 DS0s
–	–	–	–	5 DS0s and 1 channel group of 19 DS0s
8	10–12	OC3	–	–

Figure 15 on page 56 and Table 16 on page 56 show a complex channelization structure that you might encounter if you use the full capabilities of a channelized OC12 IQ interface. Partitions 1 and 8 create an OC3 interface, while Partitions 2 and 5 create T3 interfaces out of channelized OC1 interfaces. Partition 3 (channelized OC1 converted to channelized T3) and Partition 6 (channelized OC1) are channelized interfaces that each subdivide into 28 T1 interfaces. Finally, Partition 4 (channelized OC1 converted to channelized T3) and Partition 7 (channelized OC1) are channelized interfaces that each split into 2 channelized T1 interfaces and 26 T1 interfaces. The first channelized T1 splits into 24 DS0 time slots, whereas the second channelized T1 subdivides into 5 DS0 channels and 1 channel group comprised of 19 DS0 channels.

This example shows two *N*xDS0 mapping methods. Partition 4 uses M13 mapping for North American T-carrier equipment and Partition 7 uses VT mapping for SONET/SDH equipment.

This example also assumes corresponding interfaces. For example, for every sublevel T1 interface you configure on Router A, assume you have configured a matching sublevel or physical T1 interface on a neighboring router.

Router A

```
[edit]
interfaces {
   coc12-4/2/0 {
      partition 1 oc-slice 1-3 interface-type so; # Creates OC3 interface so-4/2/0:1.
      partition 2 oc-slice 4 interface-type coc1; # Creates interface coc1-4/2/0:2.
      partition 3 oc-slice 5 interface-type coc1; # Creates interface coc1-4/2/0:3.
      partition 4 oc-slice 6 interface-type coc1; # Creates interface coc1-4/2/0:4.
      partition 5 oc-slice 7 interface-type coc1; # Creates interface coc1-4/2/0:5.
      partition 6 oc-slice 8 interface-type coc1; # Creates interface coc1-4/2/0:6.
      partition 7 oc-slice 9 interface-type coc1; # Creates interface coc1-4/2/0:7.
      partition 8 oc-slice 10-12 interface-type so; # Creates an OC3 SONET interface:
   }                                                # so-4/2/0:8.
   so-4/2/0:1 {
      encapsulation ppp;
```

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```
    unit 0 {
      family inet {
        address 10.255.0.2/30;
      }
    }
}
coc1-4/2/0:2 {
    no-partition interface-type t3; # This converts the coc1 interface into a
}                                   # T3 interface: t3-4/2/0:2.
t3-4/2/0:2 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.0.6/30;
      }
    }
}
coc1-4/2/0:3 {
    no-partition interface-type ct3; # This converts the coc1 interface into a
}                                    # channelized T3 interface: ct3-4/2/0:3.
ct3-4/2/0:3 {
    partition 1-28 interface-type t1; # This converts the channelized T3 interface
}                                  # into 28 T1 channels: t1-4/2/0:3:1 through t1-4/2/0:3:28.
coc1-4/2/0:4 {
    no-partition interface-type ct3; # This converts the coc1 interface into a
}                                 # channelized T3 interface: ct3-4/2/0:4.
ct3-4/2/0:4 {
    partition 1-2 interface-type ct1; # This creates ct1-4/2/0:4:1 and ct1-4/2/0:4:2.
    partition 3-28 interface-type t1; # This creates t1-4/2/0:4:3 through
}                                     # t1-4/2/0:4:28.
coc1-4/2/0:5 {
    no-partition interface-type t3; # This converts the coc1 interface to a T3:
}                                   # t3-4/2/0:5.
t3-4/2/0:5 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.1.90/30;
      }
    }
}
coc1-4/2/0:6 {
    partition 1-28 interface-type t1; # This converts the channelized OC1 interface
}                                     # into 28 T1s: t1-4/2/0:6:1 through t1-4/2/0:6:28.
coc1-4/2/0:7 {
    partition 1-2 interface-type ct1; # This creates ct1-4/2/0:7:1 and :2.
    partition 3-28 interface-type t1; # This creates t1-4/2/0:7:3 through :28.
}
so-4/2/0:8 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.2.174/30;
      }
    }
}
```


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```
t1-4/2/0:3:1 {
   encapsulation ppp;
   unit 0 {
      family inet {
         address 10.255.0.10/30;
      }
   }
}
...
t1-4/2/0:3:28 {
   encapsulation ppp;
   unit 0 {
      family inet {
         address 10.255.0.118/30;
      }
   }
}
ct1-4/2/0:4:1 {
   partition 1 timeslots 1 interface-type ds; # This creates 24 DS0 channels:
   partition 2 timeslots 2 interface-type ds; # ds-4/2/0:4:1:1 through
   partition 3 timeslots 3 interface-type ds; # ds-4/2/0:4:1:24.
   partition 4 timeslots 4 interface-type ds;
   partition 5 timeslots 5 interface-type ds;
   partition 6 timeslots 6 interface-type ds;
   partition 7 timeslots 7 interface-type ds;
   partition 8 timeslots 8 interface-type ds;
   partition 9 timeslots 9 interface-type ds;
   partition 10 timeslots 10 interface-type ds;
   partition 11 timeslots 11 interface-type ds;
   partition 12 timeslots 12 interface-type ds;
   partition 13 timeslots 13 interface-type ds;
   partition 14 timeslots 14 interface-type ds;
   partition 15 timeslots 15 interface-type ds;
   partition 16 timeslots 16 interface-type ds;
   partition 17 timeslots 17 interface-type ds;
   partition 18 timeslots 18 interface-type ds;
   partition 19 timeslots 19 interface-type ds;
   partition 20 timeslots 20 interface-type ds;
   partition 21 timeslots 21 interface-type ds;
   partition 22 timeslots 22 interface-type ds;
   partition 23 timeslots 23 interface-type ds;
   partition 24 timeslots 24 interface-type ds;
}
ds-4/2/0:4:1:1 {
   encapsulation ppp;
   unit 0 {
      family inet {
         address 10.255.0.122/30;
      }
   }
}
...
ds-4/2/0:4:1:24 {
   encapsulation ppp;
   unit 0 {
      family inet {
```

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```
        address 10.255.0.214/30;
      }
    }
  }
  ct1-4/2/0:4:2 {
    partition 1 timeslots 1-19 interface-type ds; # This creates a channel group.
    partition 2 timeslots 20 interface-type ds; # ds-4/2/0:4:2:2 through
    partition 3 timeslots 21 interface-type ds; # ds-4/2/0:4:2:6 are single 64-Kbps
    partition 4 timeslots 22 interface-type ds; # Nx DS0 channels.
    partition 5 timeslots 23 interface-type ds;
    partition 6 timeslots 24 interface-type ds;
  }
  ds-4/2/0:4:2:1 { # This is a channel group with 19 DS0s bundled as one.
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.0.218/30;
      }
    }
  }
  ds-4/2/0:4:2:2 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.120.0.222/30;
      }
    }
  }
  ...
  ds-4/2/0:4:2:6 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.120.0.238/30;
      }
    }
  }
  t1-4/2/0:4:3 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.120.0.242/30;
      }
    }
  }
  ...
  t1-4/2/0:4:28 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.1.86/30;
      }
    }
  }
  t1-4/2/0:6:1 {
    encapsulation ppp;
```


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```
    unit 0 {
      family inet {
        address 10.255.1.94/30;
      }
    }
}
...
t1-4/2/0:6:28 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.1.202/30;
      }
    }
}
ct1-4/2/0:7:1 {
    partition 1 timeslots 1 interface-type ds; # This creates 24 DS0 channels:
    partition 2 timeslots 2 interface-type ds; # ds-4/2/0:7:1:1 through
    partition 3 timeslots 3 interface-type ds; # ds-4/2/0:7:1:24.
    partition 4 timeslots 4 interface-type ds;
    partition 5 timeslots 5 interface-type ds;
    partition 6 timeslots 6 interface-type ds;
    partition 7 timeslots 7 interface-type ds;
    partition 8 timeslots 8 interface-type ds;
    partition 9 timeslots 9 interface-type ds;
    partition 10 timeslots 10 interface-type ds;
    partition 11 timeslots 11 interface-type ds;
    partition 12 timeslots 12 interface-type ds;
    partition 13 timeslots 13 interface-type ds;
    partition 14 timeslots 14 interface-type ds;
    partition 15 timeslots 15 interface-type ds;
    partition 16 timeslots 16 interface-type ds;
    partition 17 timeslots 17 interface-type ds;
    partition 18 timeslots 18 interface-type ds;
    partition 19 timeslots 19 interface-type ds;
    partition 20 timeslots 20 interface-type ds;
    partition 21 timeslots 21 interface-type ds;
    partition 22 timeslots 22 interface-type ds;
    partition 23 timeslots 23 interface-type ds;
    partition 24 timeslots 24 interface-type ds;
}
ds-4/2/0:7:1:1 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.1.206/30;
      }
    }
}
...
ds-4/2/0:7:1:24 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.2.42/30;
      }
```

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```
    }
  }
  ct1-4/2/0:7:2 {
    partition 1 timeslots 1-19 interface-type ds; # This is a channel group.
    partition 2 timeslots 20 interface-type ds; # ds-4/2/0:7:2:2 through
    partition 3 timeslots 21 interface-type ds; # ds-4/2/0:7:2:6 are single 64-Kbps
    partition 4 timeslots 22 interface-type ds; # NxDS0 channels.
    partition 5 timeslots 23 interface-type ds;
    partition 6 timeslots 24 interface-type ds;
  }
  ds-4/2/0:7:2:1 { # This is a channel group with 19 DS0s bundled as one.
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.2.46/30;
      }
    }
  }
  ds-4/2/0:7:2:2 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.2.50/30;
      }
    }
  }
  ...
  ds-4/2/0:7:2:6 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.2.66/30;
      }
    }
  }
  t1-4/2/0:7:3 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.2.70/30;
      }
    }
  }
  ...
  t1-4/2/0:7:28 {
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.255.2.170/30;
      }
    }
  }
}
```


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Verifying Your Work

To verify correct operation of a channelized OC12 IQ interface configured for complex channelization, use the following commands:

- **show interfaces controller**
- **show interfaces**
- **show interfaces interval** (for OC12, channelized OC12, OC3, T3, channelized T3, T1, and channelized T1 channels)

To view the names of the resulting interfaces and channelized interfaces configured on a channelized OC12 IQ interface, use the **show interfaces controller** command:

```
user@RouterA> show interfaces controller
Controller                                                      Admin Link
coc12-4/2/0                                                     up    up
    so-4/2/0:1                                                  up    up
    t3-4/2/0:2                                                  up    up
    ct3-4/2/0:3                                                 up    up
        t1-4/2/0:3:1                                            up    up
        t1-4/2/0:3:2                                            up    up
        t1-4/2/0:3:3                                            up    up
        t1-4/2/0:3:4                                            up    up
        t1-4/2/0:3:5                                            up    up
        t1-4/2/0:3:6                                            up    up
        t1-4/2/0:3:7                                            up    up
        t1-4/2/0:3:8                                            up    up
        t1-4/2/0:3:9                                            up    up
        t1-4/2/0:3:10                                           up    up
        t1-4/2/0:3:11                                           up    up
        t1-4/2/0:3:12                                           up    up
        t1-4/2/0:3:13                                           up    up
        t1-4/2/0:3:14                                           up    up
        t1-4/2/0:3:15                                           up    up
        t1-4/2/0:3:16                                           up    up
        t1-4/2/0:3:17                                           up    up
        t1-4/2/0:3:18                                           up    up
        t1-4/2/0:3:19                                           up    up
        t1-4/2/0:3:20                                           up    up
        t1-4/2/0:3:21                                           up    up
        t1-4/2/0:3:22                                           up    up
        t1-4/2/0:3:23                                           up    up
        t1-4/2/0:3:24                                           up    up
        t1-4/2/0:3:25                                           up    up
        t1-4/2/0:3:26                                           up    up
        t1-4/2/0:3:27                                           up    up
        t1-4/2/0:3:28                                           up    up
    ct3-4/2/0:4                                                 up    up
        ct1-4/2/0:4:1                                           up    up
            ds-4/2/0:4:1:1                                      up    up
            ds-4/2/0:4:1:2                                      up    up
            ds-4/2/0:4:1:3                                      up    up
            ds-4/2/0:4:1:4                                      up    up
            ds-4/2/0:4:1:5                                      up    up
            ds-4/2/0:4:1:6                                      up    up
            ds-4/2/0:4:1:7                                      up    up
            ds-4/2/0:4:1:8                                      up    up
```

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```
    ds-4/2/0:4:1:9                                  up    up
    ds-4/2/0:4:1:10                                 up    up
    ds-4/2/0:4:1:11                                 up    up
    ds-4/2/0:4:1:12                                 up    up
    ds-4/2/0:4:1:13                                 up    up
    ds-4/2/0:4:1:14                                 up    up
    ds-4/2/0:4:1:15                                 up    up
    ds-4/2/0:4:1:16                                 up    up
    ds-4/2/0:4:1:17                                 up    up
    ds-4/2/0:4:1:18                                 up    up
    ds-4/2/0:4:1:19                                 up    up
    ds-4/2/0:4:1:20                                 up    up
    ds-4/2/0:4:1:21                                 up    up
    ds-4/2/0:4:1:22                                 up    up
    ds-4/2/0:4:1:23                                 up    up
    ds-4/2/0:4:1:24                                 up    up
  ct1-4/2/0:4:2                                     up    up
    ds-4/2/0:4:2:1                                  up    up
    ds-4/2/0:4:2:2                                  up    up
    ds-4/2/0:4:2:3                                  up    up
    ds-4/2/0:4:2:4                                  up    up
    ds-4/2/0:4:2:5                                  up    up
    ds-4/2/0:4:2:6                                  up    up
  t1-4/2/0:4:3                                      up    up
  t1-4/2/0:4:4                                      up    up
  t1-4/2/0:4:5                                      up    up
  t1-4/2/0:4:6                                      up    up
  t1-4/2/0:4:7                                      up    up
  t1-4/2/0:4:8                                      up    up
  t1-4/2/0:4:9                                      up    up
  t1-4/2/0:4:10                                     up    up
  t1-4/2/0:4:11                                     up    up
  t1-4/2/0:4:12                                     up    up
  t1-4/2/0:4:13                                     up    up
  t1-4/2/0:4:14                                     up    up
  t1-4/2/0:4:15                                     up    up
  t1-4/2/0:4:16                                     up    up
  t1-4/2/0:4:17                                     up    up
  t1-4/2/0:4:18                                     up    up
  t1-4/2/0:4:19                                     up    up
  t1-4/2/0:4:20                                     up    up
  t1-4/2/0:4:21                                     up    up
  t1-4/2/0:4:22                                     up    up
  t1-4/2/0:4:23                                     up    up
  t1-4/2/0:4:24                                     up    up
  t1-4/2/0:4:25                                     up    up
  t1-4/2/0:4:26                                     up    up
  t1-4/2/0:4:27                                     up    up
  t1-4/2/0:4:28                                     up    up
t3-4/2/0:5                                          up    up
coc1-4/2/0:6                                        up    up
  t1-4/2/0:6:1                                      up    up
  t1-4/2/0:6:2                                      up    up
  t1-4/2/0:6:3                                      up    up
  t1-4/2/0:6:4                                      up    up
  t1-4/2/0:6:5                                      up    up
  t1-4/2/0:6:6                                      up    up
  t1-4/2/0:6:7                                      up    up
  t1-4/2/0:6:8                                      up    up
  t1-4/2/0:6:9                                      up    up
  t1-4/2/0:6:10                                     up    up
```


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```
    t1-4/2/0:6:11                                                 up    up
    t1-4/2/0:6:12                                                 up    up
    t1-4/2/0:6:13                                                 up    up
    t1-4/2/0:6:14                                                 up    up
    t1-4/2/0:6:15                                                 up    up
    t1-4/2/0:6:16                                                 up    up
    t1-4/2/0:6:17                                                 up    up
    t1-4/2/0:6:18                                                 up    up
    t1-4/2/0:6:19                                                 up    up
    t1-4/2/0:6:20                                                 up    up
    t1-4/2/0:6:21                                                 up    up
    t1-4/2/0:6:22                                                 up    up
    t1-4/2/0:6:23                                                 up    up
    t1-4/2/0:6:24                                                 up    up
    t1-4/2/0:6:25                                                 up    up
    t1-4/2/0:6:26                                                 up    up
    t1-4/2/0:6:27                                                 up    up
    t1-4/2/0:6:28                                                 up    up
coc1-4/2/0:7                                                      up    up
    ct1-4/2/0:7:1                                                 up    up
        ds-4/2/0:7:1:1                                            up    up
        ds-4/2/0:7:1:2                                            up    up
        ds-4/2/0:7:1:3                                            up    up
        ds-4/2/0:7:1:4                                            up    up
        ds-4/2/0:7:1:5                                            up    up
        ds-4/2/0:7:1:6                                            up    up
        ds-4/2/0:7:1:7                                            up    up
        ds-4/2/0:7:1:8                                            up    up
        ds-4/2/0:7:1:9                                            up    up
        ds-4/2/0:7:1:10                                           up    up
        ds-4/2/0:7:1:11                                           up    up
        ds-4/2/0:7:1:12                                           up    up
        ds-4/2/0:7:1:13                                           up    up
        ds-4/2/0:7:1:14                                           up    up
        ds-4/2/0:7:1:15                                           up    up
        ds-4/2/0:7:1:16                                           up    up
        ds-4/2/0:7:1:17                                           up    up
        ds-4/2/0:7:1:18                                           up    up
        ds-4/2/0:7:1:19                                           up    up
        ds-4/2/0:7:1:20                                           up    up
        ds-4/2/0:7:1:21                                           up    up
        ds-4/2/0:7:1:22                                           up    up
        ds-4/2/0:7:1:23                                           up    up
        ds-4/2/0:7:1:24                                           up    up
    ct1-4/2/0:7:2                                                 up    up
        ds-4/2/0:7:2:1                                            up    up
        ds-4/2/0:7:2:2                                            up    up
        ds-4/2/0:7:2:3                                            up    up
        ds-4/2/0:7:2:4                                            up    up
        ds-4/2/0:7:2:5                                            up    up
        ds-4/2/0:7:2:6                                            up    up
    t1-4/2/0:7:3                                                  up    up
    t1-4/2/0:7:4                                                  up    up
    t1-4/2/0:7:5                                                  up    up
    t1-4/2/0:7:6                                                  up    up
    t1-4/2/0:7:7                                                  up    up
    t1-4/2/0:7:8                                                  up    up
    t1-4/2/0:7:9                                                  up    up
    t1-4/2/0:7:10                                                 up    up
    t1-4/2/0:7:11                                                 up    up
    t1-4/2/0:7:12                                                 up    up
```

```
    t1-4/2/0:7:13                                                 up    up
    t1-4/2/0:7:14                                                 up    up
    t1-4/2/0:7:15                                                 up    up
    t1-4/2/0:7:16                                                 up    up
    t1-4/2/0:7:17                                                 up    up
    t1-4/2/0:7:18                                                 up    up
    t1-4/2/0:7:19                                                 up    up
    t1-4/2/0:7:20                                                 up    up
    t1-4/2/0:7:21                                                 up    up
    t1-4/2/0:7:22                                                 up    up
    t1-4/2/0:7:23                                                 up    up
    t1-4/2/0:7:24                                                 up    up
    t1-4/2/0:7:25                                                 up    up
    t1-4/2/0:7:26                                                 up    up
    t1-4/2/0:7:27                                                 up    up
    t1-4/2/0:7:28                                                 up    up
so-4/2/0:8                                                        up    up
```

To verify that your channelized IQ interfaces are working as expected, use the **show interfaces** command. Use the **show interfaces controller** command to find the name of the channelized interface you want to view; then include this channelized name (for example, **ct3-4/2/0:4**) as an option with the **show interfaces** command.

The next sections provide sample **show interfaces** output for each of the major interface types configured in this example:

- Channelized OC12 on page 66
- SONET OC3 on page 67
- T3 on page 68
- Channelized T3 on page 70
- Channelized OC1 on page 72
- Channelized T1 on page 74
- T1 on page 75
- DS0 on page 76

Channelized OC12

```
user@RouterA> show interfaces extensive coc12-4/2/0

 Physical interface: coc12-4/2/0, Enabled, Physical link is Up
  Interface index: 266, SNMP ifIndex: 1269, Generation: 601
  Link-level type: Controller, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC12, Loopback: None,
  FCS: 16, Payload scrambler: Disabled, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  Last flapped   : 2002-10-09 17:45:15 PDT (00:14:38 ago)
  Statistics last cleared: Never
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Bucket drops: 0, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    HS link FIFO overflows: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, HS link FIFO underflows: 0
  SONET alarms   : None
```


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```
  SONET defects  : None
  SONET PHY:            Seconds        Count  State
    PLL Lock                  0            0  OK
    PHY Light                 0            0  OK
  SONET section:
    BIP-B1                   14           83
    SEF                       0            0  OK
    LOS                       0            0  OK
    LOF                       0            0  OK
    ES-S                     14
    SES-S                     0
    SEFS-S                    0
  SONET line:
    BIP-B2                   14          162
    REI-L                     0            0
    RDI-L                     3            1  OK
    AIS-L                     0            0  OK
    BERR-SF                   0            0  OK
    BERR-SD                   0            0  OK
    ES-L                     14
    SES-L                     0
    UAS-L                     0
    ES-LFE                    3
    SES-LFE                   3
    UAS-LFE                   0
  Received SONET overhead:
    F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
    S1      : 0x00
  Transmitted SONET overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00
```

SONET OC3

```
user@RouterA> show interfaces extensive so-4/2/0:8

 Physical interface: so-4/2/0:8, Enabled, Physical link is Up
  Interface index: 440, SNMP ifIndex: 2640, Generation: 787
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC3, Loopback: None, FCS: 16,
  Payload scrambler: Enabled, Parent: coc12-4/2/0 (Index 266)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Conf-ack-sent
  NCP state: inet: Down, inet6: Not-configured, iso: Not-configured, mpls: Not-configured
  CHAP state: Not-configured
  Last flapped   : 2002-10-09 17:45:18 PDT (00:11:45 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                 5967                   56 bps
   Output bytes  :                12672                  128 bps
   Input  packets:                  351                    0 pps
   Output packets:                  704                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Bucket drops: 0, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
```

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```
    HS link FIFO overflows: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, HS link FIFO underflows: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets
    0 best-effort                 704                    0                    0
    1 expedited-fo                  0                    0                    0
    2 assured-forw                  0                    0                    0
    3 network-cont                  0                    0                    0
  SONET alarms   : None
  SONET defects  : None
  SONET path:
    BIP-B3                    0            0
    REI-P                     0            0
    LOP-P                     0            0  OK
    AIS-P                     0            0  OK
    RDI-P                     0            0  OK
    UNEQ-P                    0            0  OK
    PLM-P                     0            0  OK
    ES-P                      0
    SES-P                     0
    UAS-P                     0
    ES-PFE                    0
    SES-PFE                   0
    UAS-PFE                   0
  Received SONET overhead:
    C2      : 0xcf, C2(cmp) : 0xcf, F2      : 0x00, Z3      : 0x00
    Z4      : 0x00, S1(cmp) : 0x00
  Transmitted SONET overhead:
    C2      : 0xcf, F2      : 0x00, Z3      : 0x00, Z4      : 0x00
  Received path trace: RouterB so-2/2/0:8
    61 72 6d 61 67 6e 61 63 20 73 6f 2d 32 2f 32 2f   RouterB so-2/2/
    30 3a 38 00 00 00 00 00 00 00 00 00 00 00 00 00   0:8.............
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 0d 0a   ................
  Transmitted path trace: RouterA so-4/2/0:8
    74 69 6d 6d 65 73 73 71 75 61 72 65 20 73 6f 2d   RouterA so-
    34 2f 32 2f 30 3a 38 00 00 00 00 00 00 00 00 00   4/2/0:8.........
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 0, Runt threshold: 0
  Packet Forwarding Engine configuration:
    Destination slot: 4, PLP byte: 4 (0x2a)
    CoS transmit queue             Bandwidth           Buffer Priority   Limit
                                 %         bps   %        bytes
    0 best-effort               95    147744000  95            0      low    none
    3 network-control            5      7776000   5            0      low    none
  Logical interface so-4/2/0:8.0 (Index 180) (SNMP ifIndex 2641) (Generation 512)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470, Generation: 519, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.255.2.172/30, Local: 10.255.2.174, Broadcast: Unspecified, Generation: 1029
```

T3

```
user@RouterA> show interfaces extensive t3-4/2/0:2
```

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```
Physical interface: t3-4/2/0:2, Enabled, Physical link is Up
  Interface index: 274, SNMP ifIndex: 1982, Generation: 609
  Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3, Loopback:None,
FCS: 16,
  Mode: C/Bit parity, Parent: coc12-4/2/0 (Index 266)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 85 (last seen 00:00:00 ago)
    Output: 82 (last sent 00:00:01 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls: Not-configured
  CHAP state: Not-configured
  Last flapped   : 2002-10-09 17:45:15 PDT (00:13:24 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                 2546                   56 bps
   Output bytes  :                 2732                   56 bps
   Input  packets:                  170                    0 pps
   Output packets:                  171                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Bucket drops: 0, Policed discards: 0, L3 incompletes: 0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets
    0 best-effort                  171                  171                    0
    1 expedited-fo                   0                    0                    0
    2 assured-forw                   0                    0                    0
    3 network-cont                   0                    0                    0
  Active alarms  : None
  Active defects : None
  DS3 media:            Seconds        Count  State
    PLL Lock                  0            0  OK
    Reframing                 0            0  OK
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       1         6827
    CCV                       0            0
    LES                       0
    PES                       1
    PSES                      1
    CES                       0
    CSES                      0
    SEFS                      0
    UAS                       0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 4484, Runt threshold: 0
  DSU configuration:
    Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
```

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```
    FEAC loopback: Inactive, Response: Disabled, Count: 0
  DS-3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
  SONET alarms    : None
  SONET defects   : None
  SONET path:
    BIP-B3                    0            0
    REI-P                     0            0
    LOP-P                     0            0  OK
    AIS-P                     0            0  OK
    RDI-P                     0            0  OK
    UNEQ-P                    0            0  OK
    PLM-P                     0            0  OK
    ES-P                      0
    SES-P                     0
    UAS-P                     0
    ES-PFE                    0
    SES-PFE                   0
    UAS-PFE                   0
  Received SONET overhead:
    C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00, Z3      : 0x00
    Z4      : 0x00, S1(cmp) : 0x00
  Transmitted SONET overhead:
    C2      : 0x04, F2      : 0x00, Z3      : 0x00, Z4      : 0x00
  Received path trace:
    5d 14 d6 ef 81 93 78 71 98 ec 55 27 35 84 3a 2c   ].Vo..xq.lU'5.:,
  Transmitted path trace: t3-4/2/0:2
    74 33 2d 34 2f 32 2f 30 3a 32 00 00 00 00 00 00   t3-4/2/0:2......
  Packet Forwarding Engine configuration:
    Destination slot: 4, PLP byte: 4 (0x00)
    CoS transmit queue             Bandwidth           Buffer Priority   Limit
                              %          bps   %        bytes
    0 best-effort            95     42499200  95            0      low    none
    3 network-control         5      2236800   5            0      low    none
  Logical interface t3-4/2/0:2.0 (Index 10) (SNMP ifIndex 1983) (Generation 340)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
    Protocol inet, MTU: 4470, Generation: 347, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.255.0.4/30, Local: 10.255.0.6, Broadcast: Unspecified, Generation: 685
```

Channelized T3

```
user@RouterA> show interfaces extensive ct3-4/2/0:4

Physical interface: ct3-4/2/0:4, Enabled, Physical link is Up
  Interface index: 304, SNMP ifIndex: 2409, Generation: 639
  Link-level type: Controller, MTU: 4474, Clocking: Internal, Speed: T3, Loopback: None, FCS: 16,
  Mode: C/Bit parity, Parent: coc12-4/2/0 (Index 266)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  Last flapped   : 2002-10-09 17:45:16 PDT (00:12:56 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
```


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```
 Output packets:                    0                    0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Bucket drops: 0, Policed discards: 0, L3 incompletes: 0,
  L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
Active alarms  : None
Active defects : None
DS3 media:             Seconds        Count  State
  PLL Lock                   0            0  OK
  Reframing                  0            0  OK
  AIS                        0            0  OK
  LOF                        0            0  OK
  LOS                        0            0  OK
  IDLE                       0            0  OK
  YELLOW                     0            0  OK
  BPV                        0            0
  EXZ                        0            0
  LCV                        0            0
  PCV                        1            1
  CCV                        1            1
  LES                        0
  PES                        1
  PSES                       0
  CES                        1
  CSES                       0
  SEFS                       0
  UAS                        0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 0, Runt threshold: 0
DSU configuration:
  Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
  FEAC loopback: Inactive, Response: Disabled, Count: 0
DS-3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
SONET alarms   : None
SONET defects  : None
SONET PHY:             Seconds        Count  State
  PLL Lock                   0            0  OK
  PHY Light                  0            0  OK
SONET section:
  BIP-B1                    14           83
  SEF                        0            0  OK
  LOS                        0            0  OK
  LOF                        0            0  OK
  ES-S                      14
  SES-S                      0
  SEFS-S                     0
SONET line:
  BIP-B2                    14          162
  REI-L                      0            0
  RDI-L                      3            1  OK
  AIS-L                      0            0  OK
  BERR-SF                    0            0  OK
  BERR-SD                    0            0  OK
  ES-L                      14
  SES-L                      0
  UAS-L                      0
```

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```
    ES-LFE                    3
    SES-LFE                   3
    UAS-LFE                   0
  SONET path:
    BIP-B3                    0            0
    REI-P                     0            0
    LOP-P                     0            0  OK
    AIS-P                     0            0  OK
    RDI-P                     0            0  OK
    UNEQ-P                    0            0  OK
    PLM-P                     0            0  OK
    ES-P                      0
    SES-P                     0
    UAS-P                     0
    ES-PFE                    0
    SES-PFE                   0
    UAS-PFE                   0
  Received SONET overhead:
    F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
    S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
    Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
  Transmitted SONET overhead:
    F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
    S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
    Z4      : 0x00
  Received path trace:
    39 b8 27 50 44 b6 5f c3 f3 de 27 9a a0 31 40 5c   98'PD6_Cs^'. 1@\
  Transmitted path trace: RouterA ct3-4/2/0:4
    74 69 6d 6d 65 73 73 71 75 61 72 65 20 63 74 33   RouterA ct3
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
    CoS transmit queue              Bandwidth           Buffer Priority   Limit
                              %          bps   %        bytes
    0 best-effort            95     42499200  95            0      low    none
    3 network-control         5      2236800   5            0      low    none
```

Channelized OC1

```
user@RouterA> show interfaces extensive coc1-4/2/0:7

Physical interface: coc1-4/2/0:7, Enabled, Physical link is Up
  Interface index: 381, SNMP ifIndex: 2524, Generation: 728
  Link-level type: Controller, MTU: 4474, Clocking: Internal, SONET mode, Speed: 51840kbps, Loopback:
None,
  FCS: 16, Payload scrambler: Disabled, Parent: coc12-4/2/0 (Index 266)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  Last flapped   : 2002-10-09 17:45:31 PDT (00:12:11 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Bucket drops: 0, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    HS link FIFO overflows: 0
  Output errors:
```


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```
  Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, HS link FIFO underflows: 0
SONET alarms   : None
SONET defects  : None
SONET section:
  BIP-B1                   14           83
  SEF                       0            0  OK
  LOS                       0            0  OK
  LOF                       0            0  OK
  ES-S                     14
  SES-S                     0
  SEFS-S                    0
SONET line:
  BIP-B2                   14          162
  REI-L                     0            0
  RDI-L                     3            1  OK
  AIS-L                     0            0  OK
  BERR-SF                   0            0  OK
  BERR-SD                   0            0  OK
  ES-L                     14
  SES-L                     0
  UAS-L                     0
  ES-LFE                    3
  SES-LFE                   3
  UAS-LFE                   0
SONET path:
  BIP-B3                    0            0
  REI-P                     0            0
  LOP-P                     0            0  OK
  AIS-P                     0            0  OK
  RDI-P                     0            0  OK
  UNEQ-P                    3            1  OK
  PLM-P                     3            1  OK
  ES-P                      3
  SES-P                     3
  UAS-P                     0
  ES-PFE                    0
  SES-PFE                   0
  UAS-PFE                   0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x00, C2(cmp) : 0x00, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x00, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
Received path trace:
  a0 6a b2 b6 97 aa 25 5e 54 e3 59 2a 80 84 dd fa    j26.*%^TcY*..]z
  af ec 42 d3 21 45 5d 48 f4 5a dd e5 1c be e7 65   /lBS!E]HtZ]e.>ge
  e7 f2 94 71 f1 d7 d7 86 98 83 d5 e2 ec 67 1d db   gr.qqWW...Ublg.[
  5b 72 29 b3 b9 97 98 c9 c1 a3 af e2 ab db d0 be   [r)39..IA#/b+[P>
Transmitted path trace: RouterA coc1-4/2/0:7
  74 69 6d 6d 65 73 73 71 75 61 72 65 20 63 6f 63   RouterA coc
  31 2d 34 2f 32 2f 30 3a 37 00 00 00 00 00 00 00   1-4/2/0:7.......
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 0, Runt threshold: 0
Packet Forwarding Engine configuration:
```

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```
    Destination slot: 0 (0x00)
    CoS transmit queue             Bandwidth           Buffer Priority   Limit
                             %          bps   %        bytes
    0 best-effort            95     49248000  95            0      low    none
    3 network-control         5      2592000   5            0      low    none
```

Channelized T1

user@RouterA> **show interfaces extensive ct1-4/2/0:4:1**

```
Physical interface: ct1-4/2/0:4:1, Enabled, Physical link is Up
  Interface index: 305, SNMP ifIndex: 2410, Generation: 640
  Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None, FCS: 16,
  Framing: ESF, Parent: ct3-4/2/0:4 (Index 304)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  Last flapped   : 2002-10-09 17:45:19 PDT (00:16:49 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                    0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes:0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  DS1   alarms   : None
  DS1   defects  : None
  T1  media:            Seconds        Count  State
    SEF                       1            1  OK
    BEE                       1            1  OK
    AIS                       0            0  OK
    LOF                       1            1  OK
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CS                        0            0
    LES                       1
    ES                        1
    SES                       2
    SEFS                      2
    BES                       0
    UAS                       0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 0, Runt threshold: 0
    Timeslots      : All active
    Line encoding: B8ZS, Byte encoding: Nx64K
    Buildout       : 0 to 132 feet
    Data inversion: Disabled
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
```

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```
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
    CoS transmit queue             Bandwidth           Buffer Priority   Limit
                              %          bps   %        bytes
    0 best-effort            95      1459200  95            0      low    none
    3 network-control         5        76800   5            0      low    none
```

T1

user@RouterA> **show interfaces extensive t1-4/2/0:7:3**

```
Physical interface: t1-4/2/0:7:3, Enabled, Physical link is Up
  Interface index: 414, SNMP ifIndex: 2587, Generation: 761
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None, FCS: 16, Framing:ESF,
  Parent: coc1-4/2/0:7 (Index 381)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Conf-ack-sent
  NCP state: inet: Down, inet6: Not-configured, iso: Not-configured, mpls: Not-configured
  CHAP state: Not-configured
  Last flapped   : 2002-10-09 17:45:34 PDT (00:10:33 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                10778                 112 bps
   Output bytes  :                11412                 128 bps
   Input  packets:                  634                   0 pps
   Output packets:                  634                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets
    0 best-effort                  633                  633                    0
    1 expedited-fo                   0                    0                    0
    2 assured-forw                   0                    0                    0
    3 network-cont                   0                    0                    0
  DS1   alarms   : None
  DS1   defects  : None
  T1  media:            Seconds        Count  State
    SEF                       1            1  OK
    BEE                       1            1  OK
    AIS                       3            1  OK
    LOF                      17            1  OK
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CS                        0            0
    LES                      17
    ES                       17
```

```
    SES                      34
    SEFS                     34
    BES                       0
    UAS                      14
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 1514, Runt threshold: 0
    Timeslots      : All active
    Line encoding: B8ZS, Byte encoding: Nx64K
    Buildout       : 0 to 132 feet
    Data inversion: Disabled
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  SONET alarms   : None
  SONET defects  : None
  SONET vt:
    BIP-BIP2               648           0
    REI-V                  651           1
    LOP-V                    0           0  OK
    AIS-V                    0           0  OK
    RDI-V                  651           1  Defect Active
    UNEQ-V                   0           0  OK
    PLM-V                    0           0  OK
    ES-V                   651
    SES-V                    3
    UAS-V                    0
    ES-VFE                   0
    SES-VFE                  0
    UAS-VFE                  0
  Received SONET overhead:
    V5      : 0x02, V5(cmp) : 0x02
  Transmitted SONET overhead:
    V5      : 0x02
  Packet Forwarding Engine configuration:
    Destination slot: 4, PLP byte: 4 (0x24)
    CoS transmit queue             Bandwidth           Buffer Priority   Limit
                              %          bps   %        bytes
    0 best-effort            95      1459200  95            0      low    none
    3 network-control         5        76800   5            0      low    none
  Logical interface t1-4/2/0:7:3.0 (Index 152) (SNMP ifIndex 2588)
(Generation 484)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
    Protocol inet, MTU: 1500, Generation: 491, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.255.2.68/30, Local: 10.255.2.70, Broadcast: Unspecified, Generation: 973
```

DS0

```
user@RouterA> show interfaces extensive ds-4/2/0:4:1:1

Physical interface: ds-4/2/0:4:1:1, Enabled, Physical link is Up
  Interface index: 306, SNMP ifIndex: 2411, Generation: 641
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 64kbps, Loopback: None, FCS: 16,
  Parent: ct1-4/2/0:4:1 (Index 305)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
```


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```
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 98 (last seen 00:00:01 ago)
    Output: 100 (last sent 00:00:00 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls: Not-configured
  CHAP state: Not-configured
  Last flapped   : 2002-10-09 17:45:15 PDT (00:16:20 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                 3013                    0 bps
   Output bytes  :                 3228                    0 bps
   Input  packets:                  201                    0 pps
   Output packets:                  202                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets
    0 best-effort                  202                   202                    0
    1 expedited-fo                   0                     0                    0
    2 assured-forw                   0                     0                    0
    3 network-cont                   0                     0                    0
  Interface transmit queues:
              B/W  WRR       Packets        Bytes        Drops       Errors
    Queue0      0    0             0            0            0            0
    Queue1      0    0             0            0            0            0
  HDLC configuration:
    Giant threshold: 0, Runt threshold: 0
    Timeslots      : 1
    Byte encoding: Nx64K, Data inversion: Disabled
    Idle cycle flag: flags, Start end flag: shared
  Packet Forwarding Engine configuration:
    Destination slot: 4, PLP byte: 4 (0x07)
    CoS transmit queue             Bandwidth           Buffer Priority   Limit
                              %          bps   %        bytes
    0 best-effort            95        60800  95            0      low    none
    3 network-control         5         3200   5            0      low    none
  Logical interface ds-4/2/0:4:1:1.0 (Index 39) (SNMP ifIndex 2412)
(Generation 369)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
    Protocol inet, MTU: 1500, Generation: 376, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.255.0.120/30, Local: 10.255.0.122, Broadcast: Unspecified, Generation: 743
```

Related Documentation

- Roadmap for Channelized IQ Interface Configuration Examples on page 51
- Roadmap for Configuring Channelized IQ Interfaces on page 45

Example: Converting a Channelized OC12 IQ PIC to a Channelized STM4 IQ Interface

The JUNOS software allows you to convert a Channelized OC12 IQ PIC into a channelized STM4 IQ interface. The conversion process enables the Channelized OC12 IQ PIC to

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interconnect with European SDH telecommunications equipment at the STM4 and STM1 levels, then channelize the data into North American T3, T1, and *N*xDS0 interfaces. To place the Channelized OC12 IQ PIC in SDH mode, include the **sdh** option at the **[edit chassis fpc *slot-number* pic *pic-number* framing]** hierarchy level.

Figure 16: Channelized OC12 IQ Interface in SDH Mode Example

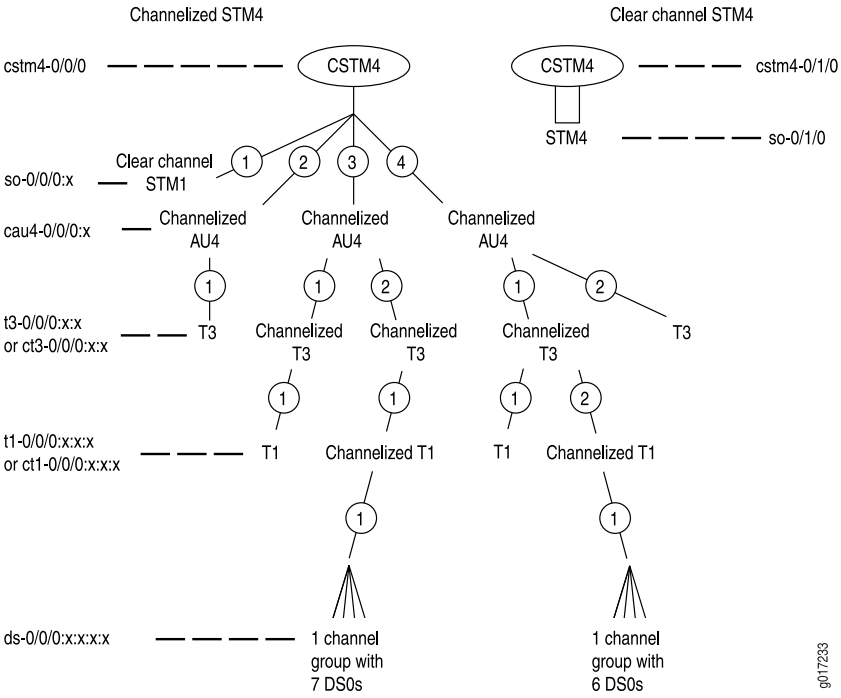

Figure 16 on page 78 and the following configuration example show how the converted channelized STM4 IQ interface can be turned into a clear channel STM4 (VC4-4c) SDH interface, or further subdivided into STM1 (VC4) interfaces and channelized administrative unit 4 (CAU4) interfaces, T3 and channelized T3 interfaces, T1 and channelized T1 interfaces, and *N*xDS0 channels.

Router A

```
[edit]
chassis {
  fpc 0 {
    pic 0 {
      framing sdh;# Converts the Channelized OC12 IQ PIC
    }          # into a channelized STM4 SDH interface.
  }
}
interfaces {
  cstm4-0/0/0 {
    partition 1 oc-slice 1-3 interface-type so; # Creates an STM1 SDH interface.
    partition 2 oc-slice 4-6 interface-type cau4; # Partitions 2, 3, and 4 create
    partition 3 oc-slice 7-9 interface-type cau4; # three channelized AU4 channels.
    partition 4 oc-slice 10-12 interface-type cau4;
  }
  so-0/0/0:1 { # A clear channel STM1 SDH (VC4) interface.
    encapsulation frame-relay;
    unit 0 {
```


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```
      dlci 16;
      family inet {
        address 10.0.0.1/30;
      }
      family inet6 {
        address abcd::10.0.0.1/126;
      }
    }
}
cau4-0/0/0:2 {
    partition 1 interface-type t3; # Creates a T3 interface from the
}           # channelized AU4 interface.
t3-0/0/0:2:1 {
    encapsulation frame-relay;
    unit 0 {
      dlci 16;
      family inet {
        address 10.0.0.5/30;
      }
      family inet6 {
        address abcd::10.0.0.5/126;
      }
    }
}
cau4-0/0/0:3 {
    partition 1 interface-type ct3; # Creates channelized T3 interfaces from the
    partition 2 interface-type ct3; # second channelized AU4.
}
ct3-0/0/0:3:1 {
    partition 1 interface-type t1; # Creates a T1 interface from the channelized T3.
}
t1-0/0/0:3:1:1 {
    encapsulation frame-relay;
    unit 0 {
      dlci 16;
      family inet {
        address 10.0.0.9/30;
      }
      family inet6 {
        address abcd::10.0.0.9/126;
      }
    }
}
ct3-0/0/0:3:2 {
    partition 1 interface-type ct1; # Creates a channelized T1 interface
}           # from the channelized T3.
ct1-0/0/0:3:2:1 {
    partition 1 timeslots 1,3-7,24 interface-type ds; # Creates an Nx DS0 channel
}           # group with seven time slots.
ds-0/0/0:3:2:1:1 {
    encapsulation frame-relay;
    unit 0 {
      dlci 16;
      family inet {
        address 10.0.0.13/30;
      }
```

```
      family inet6 {
        address abcd::10.0.0.13/126;
      }
    }
}
cau4-0/0/0:4 {
    partition 2 interface-type t3; # Creates a T3 interface.
    partition 1 interface-type ct3; # Creates a channelized T3 interface
}             # from the channelized AU4.
ct3-0/0/0:4:1 {
    partition 1 interface-type t1; # Creates a T1 interface.
    partition 2 interface-type ct1; # Creates a channelized T1 interface
}              # from the channelized T3.
t1-0/0/0:4:1:1 {
    encapsulation frame-relay;
    unit 0 {
      dlci 16;
      family inet {
        address 10.0.0.21/30;
      }
      family inet6 {
        address abcd::10.0.0.21/126;
      }
    }
}
ct1-0/0/0:4:1:2 {
    partition 1 timeslots 6,8-11,7 interface-type ds; # Creates an NxDS0 channel
}             # group with six time slots.
ds-0/0/0:4:1:2:1 {
    encapsulation frame-relay;
    unit 0 {
      dlci 16;
      family inet {
        address 10.0.0.25/30;
      }
      family inet6 {
        address abcd::10.0.0.25/126;
      }
    }
}
t3-0/0/0:4:2 {
    encapsulation frame-relay;
    unit 0 {
      dlci 16;
      family inet {
        address 10.0.0.17/30;
      }
      family inet6 {
        address abcd::10.0.0.17/126;
      }
    }
}
cstm4-0/1/0 {
    no-partition interface-type so; # Creates a clear channel SDH STM4 interface.
}
so-0/1/0 { # This is the clear channel SDH STM4 (VC4-4c) interface so-0/1/0.
```


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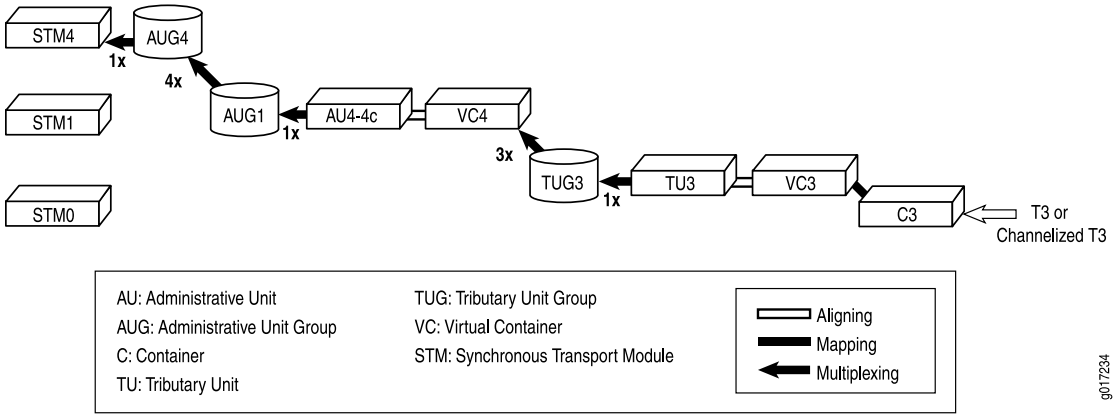
```
        unit 0 {
          family inet {
            address 10.22.22.1/30;
          }
        }
      }
    }
```

Figure 17 on page 81 shows a visual representation of the T3/channelized T3-to-STM4 SDH mapping method used by the JUNOS Software for channelized OC12 IQ interfaces configured in SDH mode.

Figure 17: Converted Channelized OC12 IQ Interface SDH Mapping Method



Verifying Your Configuration

To verify correct operation of a Channelized OC12 IQ PIC converted to a channelized STM4 IQ interface, use the following commands:

- **show interfaces**
- **show interfaces controller**

To view the interface names of the physical channelized STM4 IQ interface and the resulting interfaces configured on the channelized IQ interface, use the **show interfaces controller** and **show interfaces terse** commands:

```
user@host> show interfaces controller cstm4-0/0/0
Controller                                                    Admin Link
cstm4-0/0/0                                                    up    up
     so-0/0/0:1                                                up    up
     cau4-0/0/0:2                                              up    up
         t3-0/0/0:2:1                                          up    up
     cau4-0/0/0:3                                              up    up
         ct3-0/0/0:3:1                                         up    up
             t1-0/0/0:3:1:1                                    up    up
         ct3-0/0/0:3:2                                         up    up
             ct1-0/0/0:3:2:1                                   up    up
                 ds-0/0/0:3:2:1:1                              up    up
     cau4-0/0/0:4                                              up    up
         ct3-0/0/0:4:1                                         up    up
             t1-0/0/0:4:1:1                                    up    up
             ct1-0/0/0:4:1:2                                   up    up
```

```
                ds-0/0/0:4:1:2:1                                        up    up
          t3-0/0/0:4:2                                                  up    up
```

```
user@host> show interfaces terse *-0/0/0*
Interface               Admin Link Proto    Local                 Remote
cstm4-0/0/0             up    up
so-0/0/0:1              up    up
so-0/0/0:1.0            up    up   inet     10.0.0.1/30
                                   inet6    abcd::a00:1/126
                                            fe80::2a0:a5ff:fe5c:15a6/64
cau4-0/0/0:2            up    up
t3-0/0/0:2:1            up    up
t3-0/0/0:2:1.0          up    up   inet     10.0.0.5/30
                                   inet6    abcd::a00:5/126
                                            fe80::2a0:a5ff:fe5c:15a6/64
cau4-0/0/0:3            up    up
ct3-0/0/0:3:1           up    up
t1-0/0/0:3:1:1          up    up
t1-0/0/0:3:1:1.0        up    up   inet     10.0.0.9/30
                                   inet6    abcd::a00:9/126
                                            fe80::2a0:a5ff:fe5c:15a6/64
ct3-0/0/0:3:2           up    up
ct1-0/0/0:3:2:1         up    up
ds-0/0/0:3:2:1:1        up    up
ds-0/0/0:3:2:1:1.0      up    up   inet     10.0.0.13/30
                                   inet6    abcd::a00:d/126
                                            fe80::2a0:a5ff:fe5c:15a6/64
cau4-0/0/0:4            up    up
ct3-0/0/0:4:1           up    up
t1-0/0/0:4:1:1          up    up
t1-0/0/0:4:1:1.0        up    up   inet     10.0.0.21/30
                                   inet6    abcd::a00:15/126
                                            fe80::2a0:a5ff:fe5c:15a6/64
ct1-0/0/0:4:1:2         up    up
ds-0/0/0:4:1:2:1        up    up
ds-0/0/0:4:1:2:1.0      up    up   inet     10.0.0.25/30
                                   inet6    abcd::a00:19/126
                                            fe80::2a0:a5ff:fe5c:15a6/64
t3-0/0/0:4:2            up    up
t3-0/0/0:4:2.0          up    up   inet     10.0.0.17/30
                                   inet6    abcd::a00:11/126
                                            fe80::2a0:a5ff:fe5c:15a6/64
```

Related Documentation

- Roadmap for Channelized IQ Interface Configuration Examples on page 51
- Roadmap for Configuring Channelized IQ Interfaces on page 45

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Example: Channelized OC3 IQ Interface Configuration

Figure 18: Channelized OC3 IQ Interface Example

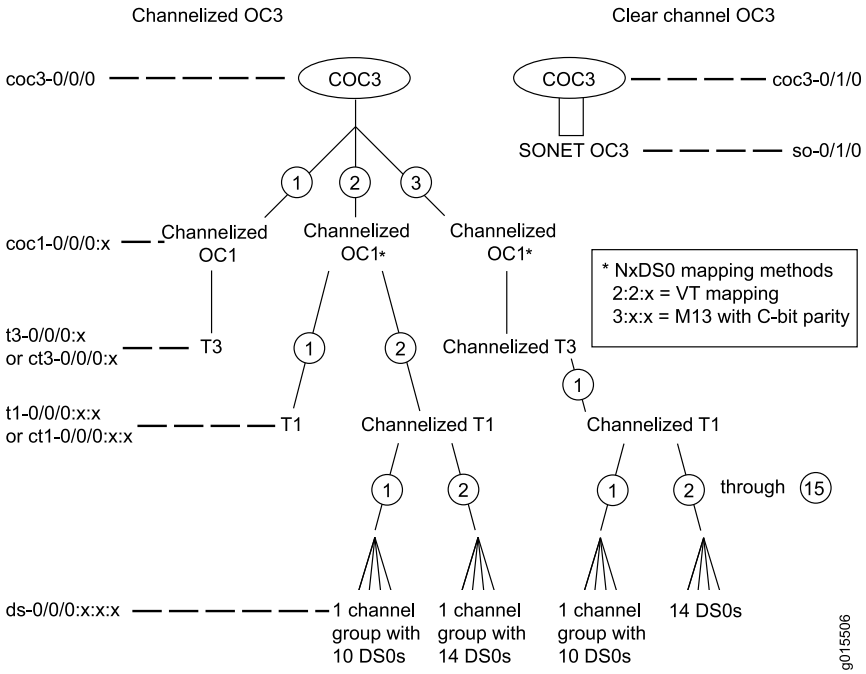

Figure 18 on page 83 shows a sample channelization structure for a channelized OC3 IQ interface. Top-level partitions **1**, **2**, and **3** create channelized OC1 interfaces. The first channelized OC1 interface, **coc1-0/0/0:1**, is converted directly into the T3 interface **t3-0/0/0:1**. The second channelized OC1 interface, **coc1-0/0/0:2**, is partitioned into a T1 interface and a channelized T1 interface. The channelized T1 interface, **t1-0/0/0:2:2**, is then further subdivided into two *N*xDS0 channel groups: **ds-0/0/0:2:2:1** and **ds-0/0/0:2:2:2**.

The remaining channelized OC1 interface, **coc1-0/0/0:3**, is converted to a channelized T3 interface, then to a channelized T1 interface, and ultimately to 14 individual *N*xDS0 channels and a channel group containing 10 *N*xDS0 channels. Additionally, channelized OC3 IQ interface **coc3-0/1/0** uses the **no-partition** statement at the **[edit interface *interface-name*]** hierarchy level to create a clear channel SONET OC3 interface **so-0/1/0**. This example shows two *N*xDS0 mapping methods. Partition 2:*x*:*x* uses VT mapping for SONET/SDH equipment, while partition 3:*x*:*x* uses M13 mapping for North American T-carrier equipment.

This example also assumes corresponding interfaces. For example, for every sublevel T1 interface you configure on Router A, assume you have configured a matching sublevel or physical T1 interface on a neighboring router.

Router A

```
[edit]
interfaces {
   coc3-0/0/0 {
      partition 1 oc-slice 1 interface-type coc1; # Creates three channelized OC1
      partition 2 oc-slice 2 interface-type coc1; # interfaces: coc1-0/0/0:1 through
```

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```
    partition 3 oc-slice 3 interface-type coc1; # coc1-0/0/0:3.
}
coc1-0/0/0:1 {
    no-partition interface-type t3; # This converts the COC1 interface into
}               # T3 interface t3-0/0/0:1.
t3-0/0/0:1 {
    no-keepalives;
    encapsulation cisco-hdlc;
    t3-options {
        fcs 32;
        feac-loop-respond;
    }
    unit 0 {
        family inet {
            address 10.21.21.2/30;
        }
    }
}
coc1-0/0/0:2 {
    partition 1 interface-type t1; # Creates the T1 interface t1-0/0/0:2:1.
    partition 2 interface-type ct1; # Creates the channelized T1 interface
}                       # ct1-0/0/0:2:2.
t1-0/0/0:2:1 {
    no-keepalives;
    encapsulation cisco-hdlc;
    t1-options {
        fcs 32;
    }
    unit 0 {
        family inet {
            address 10.12.12.2/30;
        }
    }
}
ct1-0/0/0:2:2 {
    partition 1 timeslots 1-10 interface-type ds; # This converts the channelized T1
    partition 2 timeslots 11-24 interface-type ds; # interface into two channel
}                     # groups: ds-0/0/0:2:2:1 and ds-0/0/0:2:2:2.
ds-0/0/0:2:2:1 {  # This is a channel group with 10 NxDS0s bundled as one.
    no-keepalives;
    encapsulation cisco-hdlc;
    unit 0 {
        family inet {
            address 10.13.13.2/30;
        }
    }
}
ds-0/0/0:2:2:2 { # This is a channel group with 14 NxDS0s bundled as one.
    encapsulation frame-relay;
    unit 0 {
        dlci 10;
        family inet {
            address 10.14.14.2/30;
        }
    }
}
```


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```
coc1-0/0/0:3 {
   partition 1 interface-type ct3; # Creates the channelized T3 interface
}                  # ct3-0/0/0:3.
ct1-0/0/0:3:1 {
   partition 1 timeslots 1-10 interface-type ds; # Creates a channel group.
   partition 2 timeslots 11 interface-type ds; # Creates single NxDS0 channels.
   partition 3 timeslots 12 interface-type ds;
   partition 4 timeslots 13 interface-type ds;
   partition 5 timeslots 14 interface-type ds;
   partition 6 timeslots 15 interface-type ds;
   partition 7 timeslots 16 interface-type ds;
   partition 8 timeslots 17 interface-type ds;
   partition 9 timeslots 18 interface-type ds;
   partition 10 timeslots 19 interface-type ds;
   partition 11 timeslots 20 interface-type ds;
   partition 12 timeslots 21 interface-type ds;
   partition 13 timeslots 22 interface-type ds;
   partition 14 timeslots 23 interface-type ds;
   partition 15 timeslots 24 interface-type ds;
}
ds-0/0/0:3:1:1 { # This is a channel group with 10 NxDS0s bundled as one.
   no-keepalives;
   encapsulation cisco-hdlc;
   unit 0 {
      family inet {
         address 10.31.31.2/30;
      }
   }
}
ds-0/0/0:3:1:2 { # ds-0/0/0:3:1:2 through :15 are single NxDS0s channels.
   encapsulation frame-relay;
   unit 0 {
      dlci 10;
      family inet {
         address 10.32.32.2/30;
      }
   }
}
# Assume ds-0/0/0:3:1:3 through :14 are configured here.
ds-0/0/0:3:1:15 { # ds-0/0/0:3:1:2 through :15 are single NxDS0s channels.
   encapsulation frame-relay;
   unit 0 {
      dlci 10;
      family inet {
         address 10.45.45.2/30;
      }
   }
}
coc3-0/1/0 {
   no-partition interface-type so; # Creates a clear channel SONET OC3 interface.
}
so-0/1/0 { # This is the clear channel SONET OC3 interface so-0/1/0.
   dce;
   encapsulation frame-relay;
   unit 1 {
      dlci 11;
```

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```
        family inet {
          address 10.22.22.1/30;
        }
      }
    }
  }
```

Verifying Your Work

To verify correct operation of a channelized OC3 IQ interface, use the following commands:

- **show interfaces**
- **show interfaces controller**
- **show interfaces interval** (for channelized OC3, OC3, T3, channelized T3, T1, and channelized T1 channels)

To view the interface names of the physical channelized OC3 IQ interface and the resulting interfaces configured on the channelized IQ interface, use the **show interfaces controller** command:

```
user@host> show interfaces controller coc3-0/0/0
Controller                                                      Admin Link
coc3-0/0/0                                                      up    up
    coc1-0/0/0:1                                                up    up
    t3-0/0/0:1                                                  up    up
    coc1-0/0/0:2                                                up    up
        t1-0/0/0:2:1                                            up    up
        ct1-0/0/0:2:2                                           up    up
            ds-0/0/0:2:2:1                                      up    up
            ds-0/0/0:2:2:2                                      up    up
    coc1-0/0/0:3                                                up    up
    ct3-0/0/0:3                                                 up    up
        ct1-0/0/0:3:1                                           up    up
            ds-0/0/0:3:1:1                                      up    up
            ds-0/0/0:3:1:2                                      up    up
            ds-0/0/0:3:1:3                                      up    up
            ds-0/0/0:3:1:4                                      up    up
            ds-0/0/0:3:1:5                                      up    up
            ds-0/0/0:3:1:6                                      up    up
            ds-0/0/0:3:1:7                                      up    up
            ds-0/0/0:3:1:8                                      up    up
            ds-0/0/0:3:1:9                                      up    up
            ds-0/0/0:3:1:10                                     up    up
            ds-0/0/0:3:1:11                                     up    up
            ds-0/0/0:3:1:12                                     up    up
            ds-0/0/0:3:1:13                                     up    up
            ds-0/0/0:3:1:14                                     up    up
            ds-0/0/0:3:1:15                                     up    up
```

To verify that your channelized IQ interfaces are working as expected, use the **show interfaces** command. Use the **show interfaces controller** command to find the name of the channelized interface you want to view; then include this channelized name (for example, **ct3-0/0/0:3**) as an option with the **show interfaces** command.

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The next sections provide sample **show interfaces** output for each of the major interface types configured in this example:

- Channelized OC3 on page 87
- Channelized OC1 on page 87
- T3 on page 87
- Channelized T3 on page 88
- T1 on page 88
- Channelized T1 on page 89
- NxDS0 on page 89
- Clear Channel SONET OC3 on page 89

Channelized OC3

```
user@host> show interfaces coc3-0/0/0
Physical interface: coc3-0/0/0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 1954
  Link-level type: Controller, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : 2005-02-15 20:35:24 PST (22:10:54 ago)
  SONET alarms   : None
  SONET defects  : None
```

Channelized OC1

```
user@host> show interfaces coc1-0/0/0:1
Physical interface: coc1-0/0/0:1, Enabled, Physical link is Up
  Interface index: 226, SNMP ifIndex: 1957
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: 51840kbps,
 Loopback: None,
  Parent: coc3-0/0/0 Interface index 138
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : 2004-11-04 10:55:50 PST (05:38:36 ago)
  SONET alarms   : None
  SONET defects  : None
```

T3

```
user@host> show interfaces t3-0/0/0:1
Physical interface: t3-0/0/0:1, Enabled, Physical link is Up
  Interface index: 227, SNMP ifIndex: 43
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal, Speed: T3, Loopback:
 None, FCS: 16, Mode: C/Bit parity,
  Parent: coc1-0/0/0:1 Interface index 226
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : No-Keepalives
  CoS queues     : 4 supported
```

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```
  Last flapped   : Never
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None
  DS3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^15 - 1, O.151, Pseudorandom (9), Induced error rate: 10e-0
  Logical interface t3-0/0/0:1.0 (Index 69) (SNMP ifIndex 1960)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 4470
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.21.21.0/30, Local: 10.21.21.2, Broadcast: 10.21.21.3
```

Channelized T3

```
user@host> show interfaces ct3-0/0/0:3
Physical interface: ct3-0/0/0:3, Enabled, Physical link is Up
  Interface index: 234, SNMP ifIndex: 2218
  Link-level type: Controller, Clocking: Internal, Speed: T3, Loopback: None,
Mode: C/Bit parity,
  Parent: coc1-0/0/0:3 Interface index 233
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : Never
  Active alarms  : None
  Active defects : None
  DS3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^15 - 1, O.151, Pseudorandom (9), Induced error rate: 10e-0
```

T1

```
user@host> show interfaces t1-0/0/0:2:1
Physical interface: t1-0/0/0:2:1, Enabled, Physical link is Up
  Interface index: 229, SNMP ifIndex: 2091
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 32, Framing: ESF,
  Parent: coc1-0/0/0:2 Interface index 228
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : No-Keepalives
  CoS queues     : 4 supported
  Last flapped   : Never
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None
  SONET alarms   : None
  SONET defects  : None
  Logical interface t1-0/0/0:2:1.0 (Index 70) (SNMP ifIndex 2092)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.12.12.0/30, Local: 10.12.12.2, Broadcast: 10.12.12.3
```


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Channelized T1

```
user@host> show interfaces ct1-0/0/0:2:2
Physical interface: ct1-0/0/0:2:2, Enabled, Physical link is Up
  Interface index: 230, SNMP ifIndex: 13985
  Link-level type: Controller, Clocking: Internal, Speed: T1, Loopback: None,
Framing: ESF,
  Parent: coc1-0/0/0:2 Interface index 228
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : Never
  DS1   alarms   : None
  DS1   defects  : None
  SONET alarms   : None
  SONET defects  : None
```

NxDS0

```
user@host> show interfaces ds-0/0/0:2:2:1
Physical interface: ds-0/0/0:2:2:1, Enabled, Physical link is Up
  Interface index: 231, SNMP ifIndex: 14016
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 640kbps,
Loopback: None, FCS: 16,
  Parent: ct1-0/0/0:2:2 Interface index 230
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : No-Keepalives
  CoS queues     : 8 maximum usable queues, 4 in use
  Egress queues  : 8 supported, 4 in use4 supported
  Last flapped   : Never
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Logical interface ds-0/0/0:2:2:1.0 (Index 71) (SNMP ifIndex 20889)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.13.13.0/30, Local: 10.13.13.2, Broadcast: 10.13.13.3
```

Clear Channel SONET OC3

```
user@host> show interfaces so-0/1/0
Physical interface: so-0/1/0, Enabled, Physical link is Down
  Interface index: 128, SNMP ifIndex: 15684
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal, SONET mode, Speed:
 OC3, Loopback: None, FCS: 16,
  Payload scrambler: Enabled
  Parent: coc3-0/1/0 Interface index 142
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives
  CoS queues     : 4 supported
  Last flapped   : 2004-11-04 10:53:54 PST (05:51:04 ago)
  Input rate     : 0 bps (0 pps)
```

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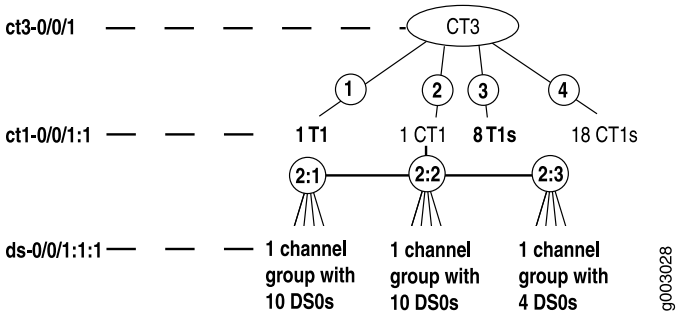
```
Output rate     : 0 bps (0 pps)
SONET alarms    : PLM-P
SONET defects   : PLM-P
Logical interface so-0/1/0.0 (Index 67) (SNMP ifIndex 15686)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
  Protocol inet, MTU: 4470
    Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 10.22.22.0/30, Local: 10.22.22.1, Broadcast: 10.22.22.3
```

Related Documentation

- Roadmap for Channelized IQ Interface Configuration Examples on page 51
- Roadmap for Configuring Channelized IQ Interfaces on page 45

Example: Channelized DS3 IQ Interface Configuration

Figure 19: Channelized DS3 IQ Interface Example



This example shows how to configure a channelized DS3 IQ interface. Figure 19 on page 90 shows the breakdown of a DS3 interface into a variety of channels. The path that leads to *N*xDS0 channels is similar to the M13 with C-bit parity method seen previously in the complex OC12 configuration example (see "Example: Complex Configuration for a Channelized OC12 IQ Interface" on page 56). This method breaks the channelized DS3 IQ interface into channelized T1s before additional splits create DS0 time slots.

To create T1 channels, include the **partition** statement at the [**edit interfaces ct3-*fpc/pic/port***] hierarchy level with the **interface-type t1** option. To create channelized T1 channels, include the **partition** statement at the [**edit interfaces ct3-*fpc/pic/port***] hierarchy level with the **interface-type ct1** option.

After you have established a channelized T1 channel, you can split it into a maximum of 24 *N*xDS0 channels. To configure *N*xDS0 channels, include the **partition** statement at the **[edit interfaces ct1-*fpc/pic/port:channel*]** hierarchy level with the **timeslots** and **interface-type ds** options to create the desired number of *N*xDS0 channels or channel groups.

Although it is not part of the example shown, you can also create a clear channel T3 or a fractional T3 interface on a channelized DS3 IQ interface. To configure a clear channel T3 or fractional T3 interface, include the **no-partition** statement at the **[edit interfaces ct3-*fpc/pic /port***] hierarchy level. After you commit this part of the configuration, a clear

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channel T3 interface is established. You can configure standard T3 options on this interface. To fractionalize the T3 interface, include the **timeslots** statement at the **[edit interfaces t3-*fpc/pic/port* t3-options]** hierarchy level.

Router A

```
[edit]
interfaces {
   ct3-0/0/1 { # This is the controller level for the channelized DS3 IQ interface.
      partition 1 interface-type t1; # This creates the t1-0/0/1:1 channel.
      partition 2 interface-type ct1; # This creates the ct1-0/0/1:2 channel.
      partition 3-10 interface-type t1; # This creates channels t1-0/0/1:3 through :10.
      partition 11-28 interface-type ct1; # This creates channels ct1-0/0/1:11 to :28.
   }
   t1-0/0/1:1 {
      ...
   }
   ct1-0/0/1:2 {
      partition 1 timeslots 1-10 interface-type ds; # These statements create
      partition 2 timeslots 11-20 interface-type ds; # three channel groups.
      partition 3 timeslots 21-24 interface-type ds;
   }
   ds-0/0/1:2:1 { # This channel group contains 10 Nx DS0s.
      unit 0 {
         family inet {
            address 10.25.1.2/24;
         }
      }
   }
   ds-0/0/1:2:2 { # This channel group contains 10 Nx DS0s.
      unit 0 {
         family inet {
            address 10.25.2.2/24;
         }
      }
   }
   ds-0/0/1:2:3 { # This channel group contains 4 Nx DS0s.
      unit 0 {
         family inet {
            address 10.25.3.2/24;
         }
      }
   }
   t1-0/0/1:3 {
      ...
   }
   t1-0/0/1:10 {
      ...
   }
   ct1-0/0/1:11 {
      ...
   }
   ct1-0/0/1:28 {
      ...
   }
}
```

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Verifying Your Work

To verify correct operation of a channelized DS3 IQ interface, use the following commands:

- **show interfaces**
- **show interfaces controller**
- **show interfaces interval** (for T3, channelized T3, T1, and channelized T1 channels)

To view the interface names of the physical channelized DS3 IQ interface and the channels configured on this interface, use the **show interfaces controller** command:

```
user@RouterA> show interfaces controller ct3-0/0/1
Controller                                                          Admin Link
ct3-0/0/1                                                           up    up
# This is the physical channelized DS3 (channelized T3) IQ interface.
    t1-0/0/1:1                                                      up    up
# Channel 1 is a channelized T1 interface.
    ct1-0/0/1:2                                                     up    up
        ds-0/0/1:2:1                                                up    up
        ds-0/0/1:2:2                                                up    up
        ds-0/0/1:2:3                                                up    up
    t1-0/0/1:3                                                      up    down
    t1-0/0/1:4                                                      up    up
    t1-0/0/1:5                                                      up    up
    t1-0/0/1:6                                                      up    up
    t1-0/0/1:7                                                      up    up
    t1-0/0/1:8                                                      up    up
    t1-0/0/1:9                                                      up    up
    t1-0/0/1:10                                                     up    up
# Channels 3 through 10 are T1 interfaces.
    ct1-0/0/1:11                                                    up    up
    ct1-0/0/1:12                                                    up    up
    ct1-0/0/1:13                                                    up    up
    ct1-0/0/1:14                                                    up    up
    ct1-0/0/1:15                                                    up    up
    ct1-0/0/1:16                                                    up    up
    ct1-0/0/1:17                                                    up    up
    ct1-0/0/1:18                                                    up    up
    ct1-0/0/1:19                                                    up    up
    ct1-0/0/1:20                                                    up    up
    ct1-0/0/1:21                                                    up    up
    ct1-0/0/1:22                                                    up    up
    ct1-0/0/1:23                                                    up    up
    ct1-0/0/1:24                                                    up    up
    ct1-0/0/1:25                                                    up    up
    ct1-0/0/1:26                                                    up    up
    ct1-0/0/1:27                                                    up    up
    ct1-0/0/1:28                                                    up    up
# Channels 11 through 28 are channelized T1 interfaces.
```

To view information about the physical channelized interface, include the **ct3-*fpc/pic/port*** option with the **show interfaces** command:

```
user@RouterA> show interfaces extensive ct3-0/0/1
Physical interface: ct3-0/0/1, Enabled, Physical link is Up
  Interface index: 30, SNMP ifIndex: 317, Generation: 29
  Link-level type: Controller, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity, Parent: None
```


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```
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  Last flapped   : 2002-10-04 10:24:18 PDT (01:40:40 ago)
  Statistics last cleared: 2002-10-04 11:47:27 PDT (00:17:31 ago)
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                    0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Bucket drops: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  Active alarms  : None
  Active defects : None
  DS3 media:             Seconds        Count  State
    PLL Lock                   0            0  OK
    Reframing                  0            0  OK
    AIS                        0            0  OK
    LOF                        0            0  OK
    LOS                        0            0  OK
    IDLE                       0            0  OK
    YELLOW                     0            0  OK
    BPV                        0            0
    EXZ                        0            0
    LCV                        0            0
    PCV                        0            0
    CCV                        0            0
    LES                        0
    PES                        0
    PSES                       0
    CES                        0
    CSES                       0
    SEFS                       0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 0, Runt threshold: 0
  DSU configuration:
    Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
    FEAC loopback: Inactive, Response: Disabled, Count: 0
  DS-3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
    CoS transmit queue              Bandwidth           Buffer Priority   Limit
                              %           bps   %         bytes
    0 best-effort            95      42499200  95             0      low    none
    3 network-control         5       2236800   5             0      low    none
```

To view information about a channelized T1 channel, include the **ct1-*fpc/pic /port:channel*** option with the **show interfaces** command:

```
user@RouterA> show interfaces extensive ct1-0/0/1:2
Physical interface: ct1-0/0/1:2, Enabled, Physical link is Up
  Interface index: 175, SNMP ifIndex: 1505, Generation: 174
```

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```
Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 16, Framing: ESF, Parent: ct3-0/0/1 (Index 32)
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link flags     : None
Hold-times     : Up 0 ms, Down 0 ms
Last flapped   : 2002-10-04 12:08:23 PDT (00:05:57 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                   0                   0 bps
 Output bytes  :                   0                   0 bps
 Input  packets:                   0                   0 pps
 Output packets:                   0                   0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
DS1   alarms   : None
DS1   defects  : AIS, LOF
T1  media:            Seconds        Count  State
  SEF                       0            0  OK
  BEE                       1            1  OK
  AIS                     355            1  Defect Active
  LOF                     355            1  Defect Active
  LOS                       0            0  OK
  YELLOW                    0            0  OK
  BPV                       0            0
  EXZ                       0            0
  LCV                       0            0
  PCV                       0            0
  CS                        0            0
  LES                     355
  ES                      355
  SES                     355
  SEFS                    355
  BES                       0
  UAS                       0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 0
  Timeslots      : All active
  Line encoding: B8ZS, Byte encoding: Nx64K
  Buildout       : 0 to 132 feet
  Data inversion: Disabled
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)
  CoS transmit queue             Bandwidth           Buffer Priority   Limit
                            %          bps   %        bytes
  0 best-effort            95      1459200  95            0      low    none
  3 network-control         5        76800   5            0      low    none
```


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To view information about an *N*xDS0 interface, include the **ds-*fpc/pic/port:channel*** option with the **show interfaces** command. In this case, the speed is 640 Kbps because this channel contains 10 DS0s (**64 x 10 = 640**).

```
user@RouterA> show interfaces extensive ds-0/0/1:2:1
Physical interface: ds-0/0/1:2:1, Enabled, Physical link is Up
  Interface index: 176, SNMP ifIndex: 1563, Generation: 175
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Parent: ct1-0/0/1:2 (Index 175)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Last flapped   : 2002-10-04 12:09:06 PDT (00:05:54 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                    0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                   0                    0                    0

  Interface transmit queues:
              B/W  WRR       Packets        Bytes        Drops       Errors
    Queue0      0    0             0            0            0            0
    Queue1      0    0             0            0            0            0
  HDLC configuration:
    Giant threshold: 0, Runt threshold: 0
    Timeslots      : 1-10
    Byte encoding: Nx64K, Data inversion: Disabled
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x10)
    CoS transmit queue             Bandwidth           Buffer Priority   Limit
                              %          bps   %         bytes
    0 best-effort            95       608000  95             0      low    none
    3 network-control         5        32000   5             0      low    none
```

Related Documentation

- Roadmap for Channelized IQ Interface Configuration Examples on page 51
- Roadmap for Configuring Channelized IQ Interfaces on page 45

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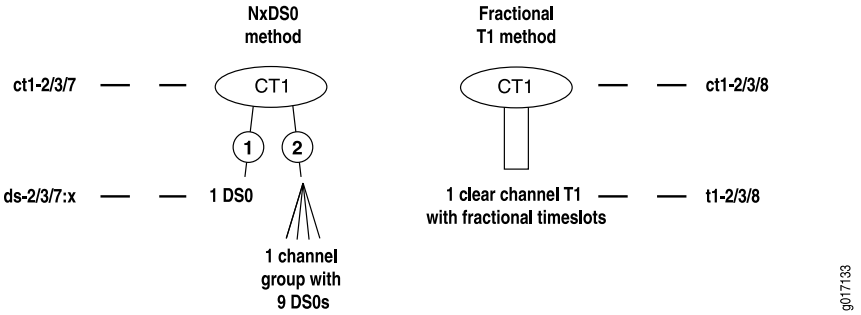
Example: Channelized T1 IQ Interface Configuration

Figure 20: Channelized T1 IQ Interface Example



The following example shows two ways to configure a channelized T1 IQ interface. Figure 20 on page 96 shows a fractional T1 method and the *N*xDS0 method seen previously in the complex OC12 configuration example (see "Example: Complex Configuration for a Channelized OC12 IQ Interface" on page 56). The *N*xDS0 method breaks the channelized T1 IQ interface into discrete DS0 blocks, whereas the fractional method creates a clear channel T1 that is segmented by time slots.

To configure *N*xDS0 channels, include the **partition** statement at the **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level. Include the **timeslots** and **interface-type ds** options to create the desired number of *N*xDS0 interfaces in time slots 1 through 24.

To configure a clear channel T1 on a channelized T1 IQ interface, include the **no-partition** statement with the **interface-type t1** option at the **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level. After you commit this configuration, you can create a fractional T1 on the clear channel T1 interface. To do so, include the **timeslots** statement at the **[edit interfaces t1-*fpc/pic/port* t1-options]** hierarchy level and specify the number of DS0 blocks to be allowed in the fractional T1 interface. The minimum number of 64-Kbps DS0 blocks you can configure is 1 and the maximum is 24.

Usually, you configure loopback statements at the controller level for all IQ-based channelized interfaces. One exception for channelized T1 IQ interfaces is that you must configure a payload loopback on a T1 IQ interface instead of the controller-level channelized T1 IQ interface. To configure, include the **payload** option at the **[edit interfaces t1-*fpc/pic/port* t1-options loopback]** hierarchy level.

Router A—NxDS0 Method

```
[edit]
interfaces {
   ct1-2/3/7 {
      partition 1 timeslots 10 interface-type ds; # Creates NxDS0 channel ds-2/3/7:1.
      partition 2 timeslots 1-9 interface-type ds; # Creates a channel group with
   }          # 9 NxDS0s.
   ds-2/3/7:1 {
      unit 0 {
         family inet {
            address 10.25.1.2/24;
         }
      }
   }
```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```
    ds-2/3/7:2 {
      unit 0 {
        family inet {
          address 10.25.2.2/24;
        }
      }
    }
}
```

Router A—Fractional T1 Method

```
[edit]
interfaces {
  ct1-2/3/8 {
    no-partition interface-type t1; # This creates a single T1 channel: t1-2/3/8.
  }
  t1-2/3/8 {
    t1-options {
      timeslots 1-2; # This statement enables only 2 of the 24 NxDS0 time slots
    }        # available on t1-2/3/8.
    unit 0 {
      family inet {
        address 10.255.126.2/24;
      }
    }
  }
}
```

Verifying Your Work

To verify correct operation of a channelized T1 IQ interface, use the following commands:

- **show interfaces**
- **show interfaces controller**

To view the interface names of the physical channelized T1 IQ interface and the resulting interfaces configured on the channelized IQ interface, use the **show interfaces controller** command:

```
user@RouterA> show interfaces controller ct1-2/3/7
Controller                                                          Admin Link
ct1-2/3/7                                                            up    up
     ds-2/3/7:1                                                       up    up
     ds-2/3/7:2                                                       up    up
# ct1-2/3/7 is the physical channelized T1 IQ interface, and ds-2/3/7:1 and
ds-2/3/7:2 are the resulting  N xDS0 interfaces.
user@RouterA>  show interfaces controller ct1-2/3/8
Controller                                                          Admin Link
ct1-2/3/8                                                           up    up
t1-2/3/8                                                             up    up
# ct1-2/3/8 is the physical channelized T1 IQ interface, and t1-2/3/8 is the
resulting T1 interface.
```

To view information about the physical channelized interface, include the **ct1-*fpc/pic/port*** option with the **show interfaces** command:

```
user@RouterA> show interfaces ct1-2/3/7
```

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```
Physical interface: ct1-2/3/7, Enabled, Physical link is Up
  Interface index: 18, SNMP ifIndex: 1128, Generation: 27
  Link-level type: Controller, Clocking: Internal, Speed: T1,
  Loopback: None, Framing: ESF, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2005-08-01 18:00:12 PDT (1d 00:31 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Statistics last cleared: Never
  DS1   alarms   : None
  DS1   defects  : None
    Line encoding: B8ZS
```

```
user@RouterA> show interfaces ct1-2/3/8
Physical interface: ct1-2/3/8, Enabled, Physical link is Up
  Interface index: 25, SNMP ifIndex: 1134, Generation: 28
  Link-level type: Controller, Clocking: Internal, Speed: T1,
  Loopback: None, Framing: ESF, Parent: None
  FCS: 16, Framing: G704, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2005-08-01 18:00:11 PDT (1d 00:30 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Statistics last cleared: Never
  DS1   alarms   : None
  DS1   defects  : None
    Line encoding: B8ZS
```

To view information about an *N*xDS0 interface, include the **ds-*fpc/pic/port:channel*** option with the **show interfaces** command:

```
user@RouterA> show interfaces ds-2/3/7:1 detail

Physical interface: ds-2/3/7:1, Enabled, Physical link is Up
  Interface index: 73, SNMP ifIndex: 1202, Generation: 325
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 64kbps, Loopback: None,
  FCS: 16, Parent: ct1-2/3/7 Interface index 18
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 11 (last seen 00:00:02 ago)
    Output: 10 (last sent 00:00:06 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Opened, iso: Opened, mpls: Not-configured
  CHAP state: Not-configured
  CoS queues     : 4 supported
  Last flapped   : 2005-08-03 12:30:37 PDT (00:10:26 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                 559                   56 bps
   Output bytes  :                 656                   56 bps
```


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```
  Input  packets:                  33                    0 pps
  Output packets:                  36                    0 pps
Queue counters:       Queued packets  Transmitted packets      Dropped packets
  0 best-effort                  40                   40                    0
  1 expedited-fo                  0                    0                    0
  2 assured-forw                  0                    0                    0
  3 network-cont                  0                    0                    0
Logical interface ds-2/3/7:1.0 (Index 36) (SNMP ifIndex 1266) (Generation 153)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 352, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 10.25.1/24, Local: 10.25.1.2, Broadcast: 10.25.1.255,
      Generation: 445
  Protocol iso, MTU: 1500, Generation: 353, Route table: 0
    Flags: Is-Primary
  Protocol inet6, MTU: 1500, Generation: 354, Route table: 0
    Flags: Is-Primary
    Addresses, Flags: Is-Preferred
      Destination: fe80::/64, Local: fe80::2a0:a5ff:fe3d:ac6, Broadcast: Unspecified,
      Generation: 446
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: feee::10:25:1:0/126, Local: feee::10:25:1:2,
      Broadcast: Unspecified, Generation: 448
```

To view information about a T1 or fractional T1 interface, include the **t1-*fpc/pic /port*** option with the **show interfaces** command. The **Speed:** field shows if the interface is a full T1(**T1**) or a fractional T1 (increments of 64 Kbps). In this case, **t1-2/3/8** is a fractional T1 using two 64-Kbps time slots for a total speed of 128 Kbps.

```
user@RouterA> show interfaces t1-2/3/8 detail
Physical interface: t1-2/3/8, Enabled, Physical link is Up
  Interface index: 89, SNMP ifIndex: 1278, Generation: 341
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 128kbps,
  Loopback: None, FCS: 16, Parent: ct1-2/3/8 Interface index 25
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 4 (last seen 00:00:05 ago)
    Output: 3 (last sent 00:00:09 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Not-configured
  CoS queues     : 4 supported
  Last flapped   : 2005-08-03 12:30:37 PDT (01:17:36 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                 189                    0 bps
   Output bytes  :                 478                    0 bps
   Input  packets:                  13                    0 pps
   Output packets:                  28                    0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                  28                   28                    0

    1 expedited-fo                  0                    0                    0
```

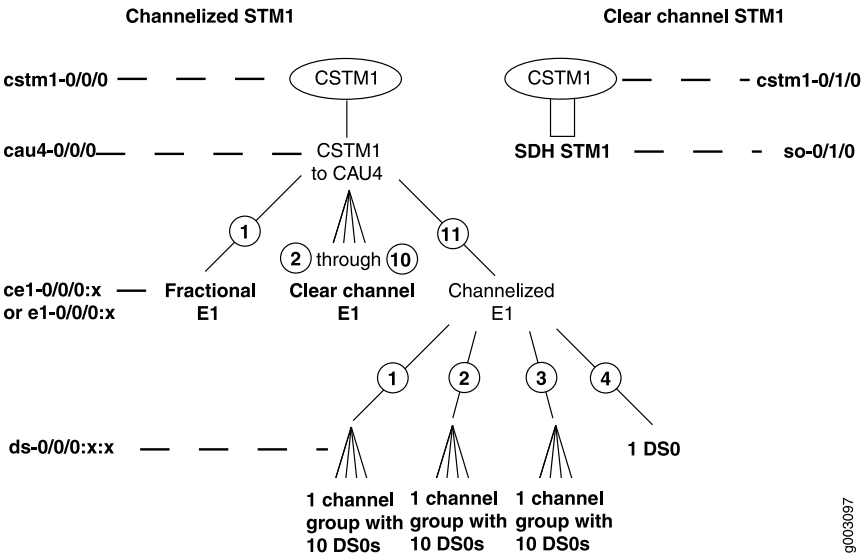
```
  2 assured-forw                 0                 0                 0

  3 network-cont                 0                 0                 0

DS1   alarms   : None
DS1   defects  : None
Logical interface t1-2/3/8.0 (Index 52) (SNMP ifIndex 1279) (Generation 169)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 401, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 10.255.126/24, Local: 10.255.126.2,
      Broadcast: 10.255.126.255, Generation: 525
```

Related Documentation

- Roadmap for Channelized IQ Interface Configuration Examples on page 51
- Roadmap for Configuring Channelized IQ Interfaces on page 45

Example: Channelized STM1 IQ Interface Configuration

Figure 21: Channelized STM1 IQ Interface Example



This example shows how to configure a channelized STM1 IQ interface on M-series or T-series routing platforms. Figure 21 on page 100 shows the breakdown of one channelized STM1 IQ interface into a variety of channels and the conversion of the second interface into a clear channel STM1.

For the first interface, you must first convert the STM1 interface into a channelized Administrative Unit 4 (AU-4) interface with the **no-partition** and **interface-type cau-4** statements at the [**edit interfaces cstm1-*fpc/pic/port***] hierarchy level. You must specify KLM or ITU-T AU-4 formatting with the **vtmapping** statement at the **[edit interfaces cau4-*fpc/pic/port* sonet-options**] hierarchy level. From the channelized AU-4 interface, you can create E1 channels or channelized E1 channels. The channelized E1 channels can be further broken into DS0 time slots.

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To create E1 channels, include the **partition** statement at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level with the **interface-type e1** option. To create channelized E1 channels, include the **partition** statement at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level with the **interface-type ce1** option.

After you have established a channelized E1 channel, you can split it into a maximum of 31 *N*xDS0 channels. To create the desired number of *N*xDS0 channels, include the **partition** statement with the **timeslots** and **interface-type ds** options at the **[edit interfaces ce1-*fpc/pic/port:channel*]** hierarchy level. Time slot **1** is reserved in an *N*xDS0-based channelized E1 channel, so you can use time slots **2** through **32**.
To create an *N*xDS0 channel group, include a range of time slots after the **timeslots** option.

You can also create fractional E1 interfaces on a channelized STM1 IQ interface. To configure a fractional E1 interface, include the **partition** statement at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level and select the **interface-type e1** option. After you commit this part of the configuration, a clear channel E1 interface is established. You can configure standard E1 options on this interface. To fractionalize the E1 interface, include the **timeslots** statement at the **[edit interfaces e1-*fpc/pic/port* e1-options]** hierarchy level. Time slot **1** is reserved in a fractional E1 channel, so you can use time slots **2** through **32**.

In the second interface shown in Figure 21 on page 100, you convert the channelized STM1 IQ interface into a clear channel STM1 interface. To configure, include the **no-partition** and **interface-type so** statements at the **[edit interfaces cstm1-*fpc/pic/port*]** hierarchy level.

```
[edit]
interfaces {
   cau4-0/0/0 {
      partition 1-10 interface-type e1; # Creates interfaces e1-0/0/0:1 through :10.
      partition 11 interface-type ce1; # Creates a single channelized E1 interface:
      sonet-options {              # e1-0/0/0:11.
         vtmapping itu-t; # This selects ITU-T as the VT mapping frame format.
      }
   }
   cstm1-0/0/0 {
      no-partition interface-type cau4; # Creates a channelized AU-4 interface:
   }          # cau4-0/0/0.
   e1-0/0/0:1 {      # Channel e1-0/0/0:1 is a fractional E1 interface.
      encapsulation ppp;
      e1-options {
         timeslots 2-21; # Setting time slots on an E1 channel makes a fractional E1.
      }
      unit 0 {
         family inet {
            address 10.133.0.1/30;
         }
      }
   }
   e1-0/0/0:2 { # Channels e1-0/0/0:2 through :10 are standard E1 interfaces.
      encapsulation ppp;
      unit 0 {
         family inet {
```

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```
            address 10.133.0.5/30;
          }
        }
      }
      ...
      e1-0/0/0:10 {
        encapsulation ppp;
        unit 0 {
          family inet {
            address 10.133.0.37/30;
          }
        }
      }
      ce1-0/0/0:11 { # Channel ce1-0/0/0:11 is a channelized E1 interface.
        partition 1 timeslots 2-11 interface-type ds; # These statements
        partition 2 timeslots 12-21 interface-type ds; # create channel groups.
        partition 3 timeslots 22-31 interface-type ds;
        partition 4 timeslots 32 interface-type ds; # This statement creates a single NXDS0
          channel.
      }
      ds-0/0/0:11:1 { # This channel group contains 10 DS0s.
        unit 0 {
          family inet {
            address 10.134.1.1/30;
          }
        }
      }
      ds-0/0/0:11:2 { # This channel group contains 10 DS0s.
        unit 0 {
          family inet {
            address 10.134.2.1/30;
          }
        }
      }
      ds-0/0/0:11:3 { # This channel group contains 10 DS0s.
        unit 0 {
          family inet {
            address 10.134.3.1/30;
          }
        }
      }
      ds-0/0/0:11:4 { # Channel ds-0/0/0:11:4 is a standard DS0 interface.
        unit 0 {
          family inet {
            address 10.134.4.1/30;
          }
        }
      }
    }
```

Figure 22 on page 103 shows a visual representation of the E1-to-STM1 SDH mapping method used by Juniper Networks in its channelized STM1 IQ interface.

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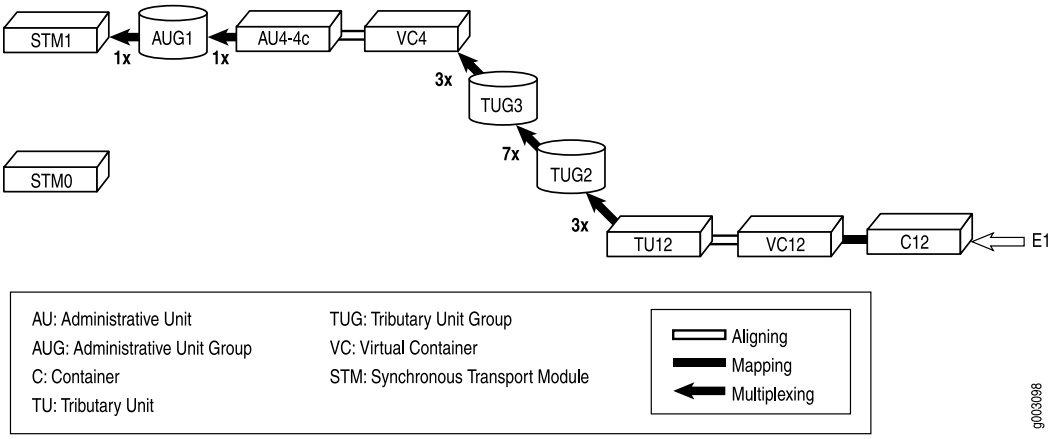
Figure 22: Channelized STM1 IQ Interface SDH Mapping Method



Verifying Your Work

To verify correct operation of a channelized STM1 IQ interface, use the following commands:

- **show interfaces**
- **show interfaces controller**
- **show interfaces interval** (for channelized STM1, E1, and channelized E1 channels)

To view the interface names of the physical channelized STM1 IQ interface and the channels configured on this interface, use the **show interfaces controller** command:

```
user@router> show interfaces controller cstm1-0/0/0
Controller                                                      Admin Link
cstm1-0/0/0                                                     up    up
cau4-0/0/0                                                      up    up
    e1-0/0/0:1                                                  up    up
    e1-0/0/0:2                                                  up    up
    e1-0/0/0:3                                                  up    up
    e1-0/0/0:4                                                  up    up
    e1-0/0/0:5                                                  up    up
    e1-0/0/0:6                                                  up    up
    e1-0/0/0:7                                                  up    up
    e1-0/0/0:8                                                  up    up
    e1-0/0/0:9                                                  up    up
    e1-0/0/0:10                                                 up    up
    ce1-0/0/0:11                                                up    up
        ds-0/0/0:11:1                                           up    up
        ds-0/0/0:11:2                                           up    up
        ds-0/0/0:11:3                                           up    up
        ds-0/0/0:11:4                                           up    up
```

To view information about the physical channelized interface, include the **cstm1-*fpc/pic/port*** option with the **show interfaces** command:

```
user@router> show interfaces cstm1-0/0/0
Physical interface: cstm1-0/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 35
  Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC3,
Loopback: None, Parent: None
```

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```
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Last flapped   : 2003-02-06 15:01:56 PST (07:15:06 ago)
  SDH   alarms   : None
  SDH   defects  : None
```

To view information about the channelized AU-4 channel, include the **cau4-*fpc/pic/port*** option with the **show interfaces** command:

```
user@router> show interfaces cau4-0/0/0
Physical interface: cau4-0/0/0, Enabled, Physical link is Up
  Interface index: 147, SNMP ifIndex: 36
  Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC3,
Loopback: None, Parent: cstm1-0/0/0 Interface index 146
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Last flapped   : 2003-02-06 19:36:31 PST (02:40:42 ago)
  SDH   alarms   : None
  SDH   defects  : None
```

To view information about an E1 channel, include the **e1-*fpc/pic/port:channel*** option with the **show interfaces** command. In this case, the fractional E1 appears as channel **e1-0/0/0:1** and the normal E1 appears as channel **e1-0/0/0:2**.

```
user@router> show interfaces e1-0/0/0:1
Physical interface: e1-0/0/0:1, Enabled, Physical link is Up
  Interface index: 148, SNMP ifIndex: 33
  Link-level type: PPP, MTU: 1504, Clocking: Internal,  Speed: 1280kbps ,
# Because the fractional E1 uses 20 time slots, 20 x 64 Kbps = 1280 Kbps.
Loopback: None, FCS: 16, Framing: G704,
  Parent: cau4-0/0/0 Interface index 147
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 1055 (00:00:03 ago), Output: 1059 (00:00:06 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
  CHAP state: Not-configured
  Last flapped   : Never
  Input rate     : 16 bps (0 pps)
  Output rate    : 16 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None
  SDH   alarms   : None
  SDH   defects  : None
  Logical interface e1-0/0/0:1.0 (Index 67) (SNMP ifIndex 169)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.133.0.0/30, Local: 10.133.0.1

user@router> show interfaces e1-0/0/0:2
Physical interface: e1-0/0/0:2, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 34
  Link-level type: PPP, MTU: 1504, Clocking: Internal,  Speed: E1,
```

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```
Loopback: None, FCS: 16, Framing: G704,
  Parent: cau4-0/0/0 Interface index 147
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 917 (00:00:05 ago), Output: 915 (00:00:01 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
  CHAP state: Not-configured
  Last flapped   : Never
  Input rate     : 16 bps (0 pps)
  Output rate    : 16 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None
  SDH   alarms   : None
  SDH   defects  : None
  Logical interface e1-0/0/0:2.0 (Index 68) (SNMP ifIndex 170)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.133.0.4/30, Local: 10.133.0.5
```

To view information about a CE1 channel, include the **ce1-*fpc/pic/port:channel*** option with the **show interfaces** command:

```
user@router> show interfaces ce1-0/0/0:11
Physical interface: ce1-0/0/0:11, Enabled, Physical link is Up
  Interface index: 169, SNMP ifIndex: 288
  Link-level type: Controller, Clocking: Internal, Speed: E1, Loopback: None,
Framing: G704, Parent: cau4-0/0/0 Interface index 147
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Last flapped   : 2003-02-06 22:05:23 PST (00:13:45 ago)
  DS1   alarms   : None
  DS1   defects  : None
  SDH   alarms   : None
  SDH   defects  : None
```

To view information about an *N*xDS0 interface, include the **ds-*fpc/pic/port:channel:channel*** option with the **show interfaces** command. For channel group **ds-0/0/0:11:1**, the speed of the link is 640 Kbps because it contains 10 DS0s (**64 x 10 = 640**). For single DS0 channel **ds-0/0/0:11:4**, the speed of the link is the standard 64 Kbps.

```
user@router> show interfaces ds-0/0/0:11:1
Physical interface: ds-0/0/0:11:1, Enabled, Physical link is Up
  Interface index: 170, SNMP ifIndex: 289
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
Loopback: Illegal, FCS: 16,
  Parent: ce1-0/0/0:11 Interface index 169
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Conf-req-sent
  NCP state: inet: Down, inet6: Not-configured, iso: Not-configured, mpls:
```

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```
Not-configured
  CHAP state: Not-configured
  Last flapped   : Never
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Logical interface ds-0/0/0:11:1.0 (Index 77) (SNMP ifIndex 290)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
    Protocol inet, MTU: 1500
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.134.1.0/30, Local: 10.134.1.1
user@router>  show interfaces ds-0/0/0:11:4
Physical interface: ds-0/0/0:11:4, Enabled, Physical link is Up
  Interface index: 173, SNMP ifIndex: 295
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 64kbps, Loopback:
Illegal, FCS: 16,
  Parent: ce1-0/0/0:11 Interface index 169
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Conf-req-sent
  NCP state: inet: Down, inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
  CHAP state: Not-configured
  Last flapped   : Never
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Logical interface ds-0/0/0:11:4.0 (Index 80) (SNMP ifIndex 296)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
    Protocol inet, MTU: 1500
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.134.4.0/30, Local: 10.134.4.1
```

Related Documentation

- Roadmap for Channelized IQ Interface Configuration Examples on page 51
- Roadmap for Configuring Channelized IQ Interfaces on page 45

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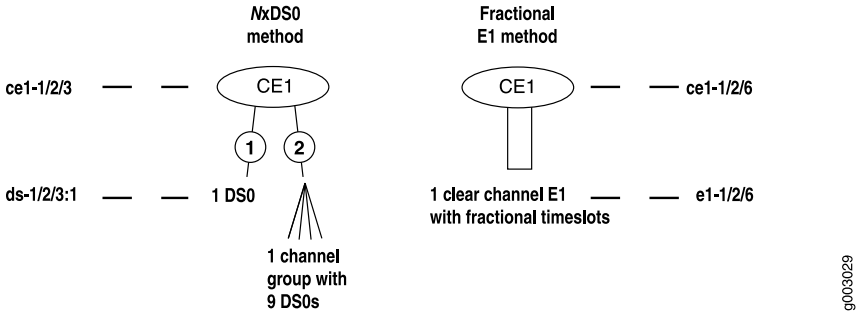
Example: Channelized E1 IQ Interface Configuration

Figure 23: Channelized E1 IQ Interface Example



This example shows two ways to configure a channelized E1 IQ interface. Figure 23 on page 107 shows a fractional E1 method and the *N*xDS0 method seen previously in the complex OC12 configuration example (see "Example: Complex Configuration for a Channelized OC12 IQ Interface" on page 56). The *N*xDS0 method breaks the channelized E1 IQ interface into discrete DS0 blocks, whereas the fractional method creates a clear channel E1 that is segmented by time slots.

To configure *N*xDS0 channels, include the **partition** statement at the **[edit interfaces ce1-*fpc /pic/port*]** hierarchy level. Include the **timeslots** and **interface-type ds** options to create the desired number of *N*xDS0 interfaces in time slots 2 through 32.

To configure a fractional E1 on a channelized E1 IQ interface, include the **no-partition** statement at the **[edit interfaces ce1-*fpc/pic/port*]** hierarchy level. After you commit this configuration, configure standard E1 options on the clear channel E1 interface. Include the **timeslots** statement at the **[edit interfaces e1-*fpc/pic/port* e1-options]** hierarchy level. Time slot **1** is reserved; use time slots **2** through **32**.

Router A—NxDS0 Method

```
[edit]
interfaces {
   ce1-1/2/3 {
      partition 1 timeslots 11 interface-type ds; # Creates NxDS0 channel ds-1/2/3:1.
      partition 2 timeslots 2-10 interface-type ds; # Creates a channel group with
   }                    # 9 NxDS0s.
   ds-1/2/3:1 {
      unit 0 {
         family inet {
            address 10.25.1.2/24;
         }
      }
   }
   ds-1/2/3:2 {
      unit 0 {
         family inet {
            address 10.25.2.2/24;
         }
      }
```

```
  }
}
```

Router A—Fractional E1 Method

```
[edit]
interfaces {
  ce1-1/2/6 {
    no-partition interface-type e1; # This creates a single E1 channel: e1-1/2/6.
  }
  e1-1/2/6 {
    e1-options {
      timeslots 2-3; # This statement enables only 2 of the 31 NxDS0 time slots
    }      # available on e1-1/2/6. You can use time slots 2 through 32.
    unit 0 {
      family inet {
        address 10.255.126.2/24;
      }
    }
  }
}
```

Verifying Your Work

To verify correct operation of a channelized E1 IQ interface, use the following commands:

- **show interfaces**
- **show interfaces controller**
- **show interfaces interval** (for E1 and channelized E1 channels)

To view the interface names of the physical channelized E1 IQ interface and the resulting interfaces configured on the channelized IQ interface, use the **show interfaces controller** command:

```
user@RouterA> show interfaces controller ce1-1/2/3
Controller                                                          Admin Link
ce1-1/2/3                                                           up    up
# This is the physical channelized E1 IQ interface.
     ds-1/2/3:1                                                       up    up
     ds-1/2/3:2                                                       up    up
# These are the resulting  N xDS0 interfaces.
user@RouterA>  show interfaces controller ce1-1/2/6
Controller                                                          Admin Link
ce1-1/2/6                                                           up    up
# This is the physical channelized E1 IQ interface.
e1-1/2/6                                                            up    up
# This is the resulting E1 interface.
```

To view information about the physical channelized interface, include the **ce1-*fpc/pic/port*** option with the **show interfaces** command:

```
user@RouterA> show interfaces ce1-1/2/3
Physical interface: ce1-1/2/3, Enabled, Physical link is Up
  Interface index: 18, SNMP ifIndex: 1128
  Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
```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```
  Link flags     : None
  Last flapped   : 2002-10-04 17:52:51 PDT (00:32:57 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None
user@RouterA>  show interfaces ce1-1/2/6
Physical interface: ce1-1/2/6, Enabled, Physical link is Up
  Interface index: 25, SNMP ifIndex: 1134
  Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: E1, Loopback:
 None,
  FCS: 16, Framing: G704, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Last flapped   : 2002-10-04 17:52:51 PDT (00:34:49 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None
```

To view information about an *N*xDS0 interface, include the **ds-*fpc/pic/port:channel*** option with the **show interfaces** command:

```
user@RouterA> show interfaces ds-1/2/3:1 detail

Physical interface: ds-1/2/3:1, Enabled, Physical link is Up
  Interface index: 73, SNMP ifIndex: 1202, Generation: 325
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 64kbps, Loopback: None,
  FCS: 16, Parent: ce1-1/2/3 (Index 18)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 11 (last seen 00:00:02 ago)
    Output: 10 (last sent 00:00:06 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Opened, iso: Opened, mpls: Not-configured
  CHAP state: Not-configured
  Last flapped   : 2002-10-04 18:24:32 PDT (00:01:46 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                 559                   56 bps
   Output bytes  :                 656                   56 bps
   Input  packets:                  33                    0 pps
   Output packets:                  36                    0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets
    0 best-effort                  40                   40                    0
    1 expedited-fo                  0                    0                    0
    2 assured-forw                  0                    0                    0
    3 network-cont                  0                    0                    0
  Logical interface ds-1/2/3:1.0 (Index 36) (SNMP ifIndex 1266) (Generation 153)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 352, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.25.1/24, Local: 10.25.1.2, Broadcast: Unspecified,
        Generation: 445
    Protocol iso, MTU: 1500, Generation: 353, Route table: 0
```

```
  Flags: Is-Primary
Protocol inet6, MTU: 1500, Generation: 354, Route table: 0
  Flags: Is-Primary
  Addresses, Flags: Is-Preferred
    Destination: fe80::/64, Local: fe80::2a0:a5ff:fe3d:ac6, Broadcast: Unspecified,
    Generation: 446
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: feee::10:25:1:0/126, Local: feee::10:25:1:2,
    Broadcast: Unspecified, Generation: 448
```

To view information about the fractional E1 interface, include the **e1-*fpc/pic/port*** option with the **show interfaces** command:

```
user@RouterA> show interfaces e1-1/2/6 detail
Physical interface: e1-1/2/6, Enabled, Physical link is Up
  Interface index: 89, SNMP ifIndex: 1278, Generation: 341
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1, Loopback:None,

  FCS: 16, Framing: G704, Parent: ce1-1/2/6 (Index 25)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 4 (last seen 00:00:05 ago)
    Output: 3 (last sent 00:00:09 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Not-configured
  Last flapped   : 2002-10-04 18:28:27 PDT (00:01:07 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                 189                    0 bps
   Output bytes  :                 478                    0 bps
   Input  packets:                  13                    0 pps
   Output packets:                  28                    0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                  28                   28                    0

    1 expedited-fo                  0                    0                    0

    2 assured-forw                  0                    0                    0

    3 network-cont                  0                    0                    0

  DS1   alarms   : None
  DS1   defects  : None
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: Unknown (0)
  Logical interface e1-1/2/6.0 (Index 52) (SNMP ifIndex 1279) (Generation 169)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
    Protocol inet, MTU: 1500, Generation: 401, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.255.126/24, Local: 10.255.126.2, Broadcast: Unspecified,
```


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```
Generation: 525
```

Related Documentation

- Roadmap for Channelized IQ Interface Configuration Examples on page 51
- Roadmap for Configuring Channelized IQ Interfaces on page 45

Example: DLCI Class of Service on a Channelized IQ Interface Configuration

This example applies class of service at the logical interface level on a clear channel T3 interface derived from a channelized DS3 IQ interface. (For more information on configuring a channelized DS3 IQ interface, see "Example: Channelized DS3 IQ Interface Configuration" on page 90.)

Configure a scheduler map, complete with the desired transmit rates, buffer sizes, and service classes. Once the scheduler map is ready, enable logical interface-level class of service with the **per-unit-scheduler** statement at the [**edit interfaces** *interface-name*] hierarchy level. Also, configure a DLCI for each logical interface with the **dlci** *dlci-number* statement at the [**edit interfaces** *interface-name* **unit** *unit-number*] hierarchy level. Finally, configure the logical interfaces for class of service with the **scheduler-map** and **shaping-rate** statements at the [**edit class-of-service interfaces** *interface-name* **unit** *unit-number*] hierarchy level. These statements specify which scheduler map to associate with each logical interface and how much bandwidth to reserve for the DLCI queues.

```
[edit]
interfaces {
   ct3-3/1/0 {
      no-partition interface-type t3; # This converts the channelized DS3 IQ
   }
   t3-3/1/0 {
      per-unit-scheduler; # This enables scheduling at the logical interface level.
      encapsulation frame-relay;
      unit 0 {# The logical interface where scheduler map sched-0 takes effect.
         dlci 100; # The DLCI affected by scheduler map sched-0.
         family inet {
            address 10.40.1.1/30;
         }
      }
      unit 1 {# The logical interface where scheduler map sched-1 takes effect.
         dlci 101; # The DLCI affected by scheduler map sched-1.
         family inet {
            address 10.40.2.1/30;
         }
      }
   }
}
class-of-service {
   interfaces {
      t3-3/1/0 { # This specifies the channel where the scheduled DLCI is located.
         unit 0 { # This specifies the logical interface for the first scheduled DLCI.
            scheduler-map sched-0; # This applies a scheduler map to the first DLCI.
            shaping-rate 10m; # This reserves bandwidth for scheduler map sched-0.
         }
```

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```
        unit 1 { # This specifies the logical interface for the second scheduled DLCI.
          scheduler-map sched-1; # Applies a scheduler map to the second DLCI.
          shaping-rate 10m; # This reserves bandwidth for scheduler map sched-1.
        }
      }
    }
    scheduler-maps {
      sched-0 { # This is where classes of service are associated with a scheduler.
        forwarding-class assured-forwarding scheduler af;
        forwarding-class best-effort scheduler be;
        forwarding-class expedited-forwarding scheduler ef;
      }
      sched-1 { # This is where classes of service are associated with a scheduler.
        forwarding-class assured-forwarding scheduler af-1;
        forwarding-class best-effort scheduler be-1;
        forwarding-class expedited-forwarding scheduler ef-1;
      }
    }
    schedulers {
      af {
        transmit-rate percent 10;
        buffer-size percent 10;
      }
      be {
        transmit-rate percent 20;
        buffer-size percent 20;
      }
      ef {
        transmit-rate percent 70;
        buffer-size percent 70;
      }
      af-1 {
        transmit-rate percent 10;
        buffer-size percent 10;
      }
      be-1 {
        transmit-rate percent 30;
        buffer-size percent 30;
      }
      ef-1 {
        transmit-rate percent 60;
        buffer-size percent 60;
      }
    }
  }
```

Verifying Your Work

To verify correct operation of class-of-service schedulers on a channelized IQ interface, use the following commands:

- **show class-of-service forwarding-table**
- **show class-of-service interface**

```
user@router> show class-of-service interface t3-3/1/0
```


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```
Physical interface: t3-3/1/0, Index: 169
  Scheduler map: <default>, Index: 1
  Logical interface: t3-3/1/0.0, Index: 68
    Object         Name                   Type                        Index
    Scheduler-map  sched-0                                           11204
    Rewrite        exp-default            exp                           2
    Classifier     ipprec-compatibility   ip                            5
  Logical interface: t3-3/1/0.1, Index: 69
    Object         Name                   Type                        Index
    Scheduler-map  sched-1                                            7038
    Rewrite        exp-default            exp                           2
    Classifier     ipprec-compatibility   ip                            5
```

Related Documentation

- Roadmap for Channelized IQ Interface Configuration Examples on page 51
- Roadmap for Configuring Channelized IQ Interfaces on page 45

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CHAPTER 4

Configuring Channelized E1 PRI and T1 PRI Interfaces

- Channelized E1 PRI and T1 PRI Overview on page 115
- Configuring a Clear Channel on a Dual-Port Channelized T1-E1 PIM on page 116
- Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots on page 116
- Configuring Primary Rate Interfaces on page 117
- Example: Configuring a Channelized T1 Interface as Primary Rate Interface on page 119
- Configuring PRI Interfaces on page 120
- Allocating B-Channels for Dialout on page 121

Channelized E1 PRI and T1 PRI Overview

J Series Services Routers equipped with a Dual-Port Channelized T1/E1 PIM support Integrated Services Digital Network (ISDN) Primary Rate Interfaces (PRIs). ISDN PRI, referred to as S2M in Europe, is the “primary” extended ISDN network interface. It offers a larger capacity of digital channels utilizing a variety of improved mediums, and is used by large organizations with intensive communication needs. In contrast, the ISDN Basic Rate Interface (BRI), known as SO in Europe, provides a limited number of channels, transmitting over copper wire, and is used by smaller organizations or individuals with less intensive communication needs. For more information about configuring ISDN BRI interfaces, see *Configuring ISDN Physical Interface Properties*.

Unlike channelized PICs on the M Series and T Series routers, the interface type on the Dual-Port Channelized T1/E1 PIM is configurable. A single interface can operate as either a channelized T1 or channelized E1 interface (or clear channel) or as an ISDN PRI. The ISDN PRI channels can operate on the same interface as T1 or E1 channels. The PIM also supports a “drop-and-insert” feature, allowing you to insert channels from one port on the PIM into the other port on the PIM.

These ISDN channels are delivered to the user in one of two predefined configurations:

- ISDN BRI is configured by specifying properties for a physical (**br-**) interface and a logical (**dl*n***) interface.
- For ISDN PRI, you configure:

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1. Either a channelized E1 (**ce1-*pim*/0/*port***) or channelized T1 (**ct1-*pim*/0/*port***) interface.
2. Time slots within a **ce1-*pim*/0/*port*** interface or **ct1-*pim*/0/*port*** interface.
3. A bearer (B) channel **bc-*pim*/0/*port*:*channel*** interface for each time slot that you want to function as an ISDN PRI B-channel. The B-channel is used for data, video, voice, and multimedia. You can create up to 30 B-channels on a channelized E1 interface, and 23 B-channels on a channelized T1 interface.
4. One delta (D) channel, used between switching equipment in the ISDN network and the ISDN equipment at your site for signaling. For channelized E1, the D-channel must be time slot 16. For channelized T1, the D-channel must be time slot 24.

NOTE: **Time slots can also be shared with ds-*pim*/0/*port* time slots within the same channelized interface.**

Channelized E1 and T1 PIMs on J Series routers provide support for ISDN PRI connectivity for dial-in and callback, and for use as primary or backup network connections.

Configuring a Clear Channel on a Dual-Port Channelized T1-E1 PIM

A *clear channel* is an interface that uses the entire bandwidth of the port on a PIM. To configure a clear channel, include the **no-partition** and **interface-type** statements in the configuration. On a Dual-Port Channelized T1-E1 PIM, you can configure two clear-channel interfaces.

To configure an E1 interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces ce1-*pim*/0/*port*]** hierarchy level:

```
[edit interfaces ce1-pim/0/port]
no-partition interface-type e1;
```

This configuration creates interface **e1-*pim*/0/*port***.

To configure aT1 interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces ct1-*pim*/0/*port*]** hierarchy level:

```
[edit interfaces ct1-pim/0/port]
no-partition interface-type t1;
```

This configuration creates interface **t1-*pim*/0/*port***.

Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots

On channelized T1/E1 interfaces configured for channelized operation, you can insert channels (time slots) from one port (for example, channels carrying voice) directly into the other port on the PIM, to replace channels coming through the Routing Engine. This feature, known as drop and insert, allows you to integrate voice and data on a single T1 or E1 link by removing the DS0 time slots of one T1 or E1 port and replacing them by inserting the time slots of another T1 or E1 port. It is not necessary to use the same time

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slots on both interfaces, but the time slots count must be same. The channels that are not configured for the drop-and-insert feature are used for normal traffic.

You can configure:

- 30 channelized E1 time slots, with the 16th time slot operating as the signaling channel
- 23 channelized T1 time slots, with the 24th time slot operating as the signaling channel

The signaling channel, or D-channel, must be part of the channels that are being switched through the drop-and-insert functionality. The Junos OS does not support switching of voice and data between ports by default.

Both ports involved in the drop-and-insert configuration must use the same clock source—either the router's internal clock or an external clock.

The following clock source settings are valid:

- When port 0 is set to use the internal clock, port 1 must also be set to use it, and vice versa.
- When port 0 is set to use its external clock, port 1 must be set to run on the same clock—the external clock for port 0.
- When port 1 is set to use its external clock, port 0 must be set to run on the same clock—the external clock for port 1.

For more details about valid clock combinations, see the *Junos OS Interfaces and Routing Configuration Guide*.

To configure drop-and-insert time slots on a channelized T1 interface, include the **partition** statement at the **[edit interfaces ct1-*pim*/0/*port*]** hierarchy level with the **timeslots** statement and **interface-type** statements specified:

```
[edit interfaces]
ct1-pim/0/port {
    partition 1 timeslots 1-10 interface-type ds;
    partition 2 timeslots 11-14 interface-type ds;
    partition 3 timeslots 15-32 interface-type ds;
}
```

This configuration creates interfaces **ds-*pim*/0/*port*:1**, **ds-*pim*/0/*port*:2**, and **ds-*pim*/0/*port*:3**.

Use the same configuration to create drop-and insert time slots on a channelized E1 interface by including the **partition** statement and options at the **[edit interfaces ce1-*pim*/0/*port*]** hierarchy level.

Configuring Primary Rate Interfaces

Primary rate interfaces are a combination of B-channels with one controlling D-channel for the group. Configure B-channel interfaces for each time slot that you want to function as an ISDN PRI interface. The B-channel is used for data, video, voice, and multimedia. You can create:

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- 23 B-channels on a channelized T1 interface
- 30 B-channels on a channelized E1 interface

To configure B-channels on a channelized T1 interface, include the **partition** statement at the **[edit interfaces ct1-*pim*/0/*port*]** hierarchy level with the **timeslots** statement and **interface-type bc** specified:

```
[edit interfaces]
ct1-pim/0/port {
  partition 1-23 timeslots 1-23 interface-type bc;
}
```

This configuration creates interfaces **bc-*pim*/0/*port*:1** through **bc-*pim*/0/*port*:1**, and **ds-*pim*/0/*port*:3**.

Use the same configuration to create B-channels on a channelized E1 interface by including the **partition** statement and options at the **[edit interfaces ce1-*pim*/0/*port*]** hierarchy level.

One D-channel is used between switching equipment in the ISDN network and the ISDN equipment at your site for signaling. For channelized E1, the D-channel must be time slot 16. For channelized T1, the D-channel must be time slot 24.

To configure a D-channel on a channelized T1 interface, include the **partition** statement at the **[edit interfaces ct1-*pim*/0/*port*]** hierarchy level with the **timeslots** statement and **interface-type dc** specified:

```
[edit interfaces]
ct1-pim/0/port {
partition 24 timeslots 24 interface-type dc;
```

This configuration creates interfaces **dc-*pim*/0/*port***.

Use the same configuration to create B-channels on a channelized E1 interface by including the **partition** statement and options at the **[edit interfaces ce1-*pim*/0/*port*]** hierarchy level.

```
[edit interfaces]
ce1-pim/0/port {
  partition 16 timeslots 16 interface-type dc;
}
```

To view PRI or ISDN options information about interface, use the following operational mode commands supporting BRI interfaces:

- **show interfaces *interface-name* detail**
- **show interface *dln***
- **show isdn calls**
- **show isdn history**
- **show isdn q921 statistics**
- **show isdn q931 statistics**
- **show isdn status**

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NOTE: You must configure a D-channel and B-channels to complete your ISDN PRI line configuration.

NOTE: You can configure dso-options on the B-channel, but you cannot configure parameters for a D-channel. However, when interface statistics are displayed, both B-channel and D-channel interfaces have statistical values.

Example: Configuring a Channelized T1 Interface as Primary Rate Interface

Configure a channelized T1 interface to operate fully as a PRI:

```
[edit interfaces]
ct1-2/0/0 {
    partition 1-23 timeslots 1-23 interface-type bc;
    partition 24 timeslots 24 interface-type dc;
    t1-options {
        line-encoding b8zs;
        framing esf;
    }
    traceoptions {
        flag q931;
        flag q921;
        file {
            pri_trace_log;
        }
    }
    dialer-options {
        pool 1 priority 25;
    }
    isdn-options {
        switch-type att5e;
        bchannel-allocation descending;
        incoming-called-number 384101;
        incoming-called-number 384102;
        incoming-called-number 384103;
    }
}
```

```
[edit interfaces]
dl0 {
    unit 0 {
        dialer-options {
            pool 1;
            dial-string 384010;
            incoming-map {
                accept-all;
            }
        }
        family inet {
            filter {
```

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```
            dialer int-packet;
          }
          address 13.1.1.2/24;
        }
      }
    }
    [edit firewall]
    family inet {
      dialer-filter int-packet {
        term term1 {
          from {
            destination address {
              13.1.1.1/24;
            }
            protocol icmp;
            then note;
          }
        }
        term term2 {
          then ignore;
        }
      }
    }
```

Related Documentation

- Channelized Interfaces Overview on page 3

Configuring PRI Interfaces

When you create a PRI from a channelized E1 or channelized T1 interface, you can select all the slots for the PRI, or just a few of them, leaving the rest as **ds-** interfaces.

To configure a PRI from a channelized T1 interface, include the **partition** statement at the **[edit interfaces ct1-*pim*/0/*port*]** hierarchy level with the **timeslots** statement and **interface-type bc** specified:

```
[edit interfaces]
ct1-pim/0/port {
  partition 1 timeslots 1-10 interface-type ds;
  partition 2 timeslots 11-24 interface-type pr;
}
```

This configuration creates interfaces **ds-*pim*/0/*port*:1** through **pr-*pim*/0/*port*:2**.

Use the same configuration to create interfaces on a channelized E1 interface by including the **partition** statement and options at the **[edit interfaces ce1-*pim*/0/*port*]** hierarchy level.

To configure channelized E1 interface properties, include the **e1-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
e1-options {
  fcs (16 | 32);
  framing (g704 | g704-no-crc4 | unframed);
  idle-cycle-flag (flags | ones);
```


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```
    loopback (local | remote);
    start-end-flag (filler | shared);
}
```

To specify options for each of the DS0 channels, include the **ds0-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
ds0-options {
    byte-encoding (nx56 | nx64);
    fcs (16 | 32);
    idle-cycle-flag (flags | ones);
    loopback payload;
    start-end-flag (filler | shared);
}
```

Allocating B-Channels for Dialout

You can configure the system to allocate B-channels for dialout from lowest or highest numbered B-channel (ascending or descending order). By configuring this feature, you reduce chances of "glare" on PRI lines carrying a mix of incoming and outgoing calls.

To configure the B-channel allocation, include the **idsn-options** and **bchannel-allocation** statements at the **[edit interfaces ct1-*pim*/0/*port* | ce1-*pim*/0/*port*]** hierarchy level:

```
[edit interfaces]
(ct1-pim/0/port | ce1-pim/0/port) {
    isdn-options {
    (bchannel-allocation (ascending | descending);
    }
}
```

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CHAPTER 5

Configuring Channelized OC3 IQ and IQE Interfaces

- Channelized OC3 IQ and IQE Overview on page 123
- Partitions, OC Slices, Interface Types, and Time Slots on page 124
- Configuring a Clear Channel on Channelized OC3 IQ and IQE PICs on page 125
- Configuring T3 Interfaces on IQ and IQE Interfaces on page 126
- Configuring T1 and NxDS0 Interfaces on page 126
- Configuring Fractional T1 IQ Interfaces on page 130
- Configuring Link PIC Failover on Channelized OC3 IQ and IQE Interfaces on page 130

Channelized OC3 IQ and IQE Overview

Channelized intelligent queuing (IQ) and channelized enhanced intelligent queuing (IQE) interfaces allow arbitrary and dynamic channelization of serial links, allowing greater flexibility than regular channelized interfaces.

On each port of a Channelized OC3 IQ or a Channelized OC3 IQE interface, you can configure the following interface types:

- One OC3 SONET interface
- Up to three T3 interfaces
- Up to 84 T1 interfaces
- Up to three E3 interfaces (COC3 IQE PICs in SDH mode)
- Up to 63 E1 interfaces (COC3 IQE PICs in SDH mode)
- Up to 336 *N*xDS0 interfaces on an M Series router
- Up to 768 *N*xDS0 interfaces on a T Series router

Figure 24 on page 124 shows an example of how a Channelized OC3 PIC might be partitioned. In the figure, the OC3 SONET interface would be a standalone interface because it would use the entire bandwidth of the PIC. The same applies to each port of the 2–port Channelized OC3 Enhanced IQ (IQE) PIC.

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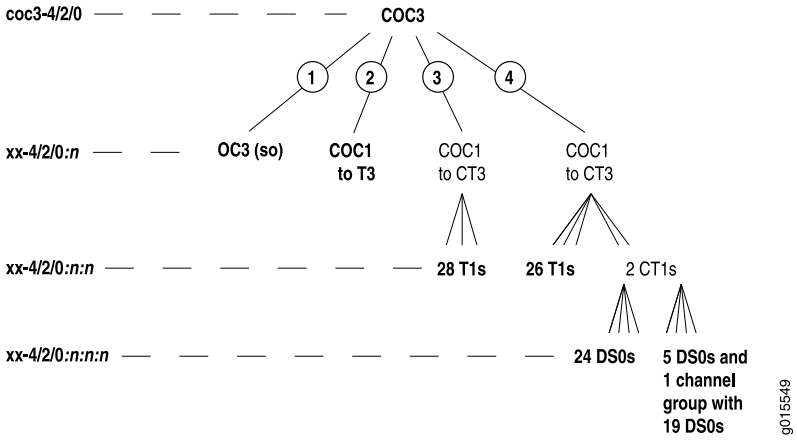
Figure 24: Channelized OC3 IQ Interface Example for Show Interfaces Controller



You can configure the following encapsulation types:

- PPP
- Frame Relay
- Cisco HDLC
- CCC
- TCC
- MPLS—On IQE interfaces.

For more information about interface encapsulation, see *Configuring Interface Encapsulation on Physical Interfaces* and *Configuring Interface Encapsulation on Logical Interfaces*.

To configure channelized interfaces, include the following statements at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
no-partition interface-type type;
partition partition-number oc-slice oc-slice-range interface-type type;
partition partition-number timeslots time-slot-range interface-type type;
```

Related Documentation

- *Channelized Interfaces Feature Guide for Routing Devices*

Partitions, OC Slices, Interface Types, and Time Slots

The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized OC3 interfaces, you can configure up to three OC1 interfaces, so the partition number can be **1**, **2**, or **3**. For channelized T3 interfaces (**ct3**), you can configure multiple interfaces at once by including a partition range, such as **1-3**. This creates three T1 interfaces with channel numbers 1 through 3.

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NOTE: For channelized IQ and IQE interfaces, channel numbering begins with 1 (:1). For regular channelized interfaces, channel numbering begins with 0 (:0).

You configure the OC-slice range for SONET/SDH interfaces only. The OC-slice range is correlated with the bandwidth size required for the interface type you are configuring. For example, a channelized OC3 interface (**coc3**) can be divided into three OC1 interfaces, each containing one OC slice. Therefore the OC-slice value must be **1**, **2**, or **3**.

The configurable interface types are dependent on the hierarchy level at which you include the **interface-type** and **partition** or **no-partition** statements. For example, when you include the **no-partition** statement at the **[edit interfaces coc3-*fpc/pic/port*]** hierarchy level, the only configurable interface type is **so**, because the **no-partition** statement signals that you are creating a clear-channel SONET/SDH interface. When you include the **partition** statement at the **[edit interfaces coc1-*fpc/pic/port*]** hierarchy level, the configurable interface types are **ct1** or **t1**. If you want to create a T1 interface, include the **t1** option. If you want to further channelize down to the *N*xDS0 level, include the **ct1** option as an intermediate step before dividing the channelized T1 interface (**ct1**) into *N*xDS0 interfaces.

You configure time slots for fractional T1 interfaces and *N*xDS0 interfaces. You can configure ranges by using hyphens. You can configure discontinuous time slots by using commas. Do not include spaces.

Related Documentation

- oc-slice on page 419

Configuring a Clear Channel on Channelized OC3 IQ and IQE PICs

A *clear channel* is an interface that uses the entire bandwidth of the PIC. To configure a clear channel, include the **no-partition** and **interface-type** statements in the configuration.

On Channelized OC3 IQ and IQE PICs, you can configure one OC3 clear-channel interface per port. To configure an OC3 interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces coc3-*fpc/pic/port*]** hierarchy level:

```
[edit interfaces coc3-fpc/pic/port]
no-partition interface-type so;
```

This configuration creates interface **so-*fpc/pic/port***. When you include the **no-partition** statement at the [edit interfaces **coc3-*fpc/pic/port*]** hierarchy level, the only configurable interface type is **so**, because the **no-partition** statement signals that you are creating a clear-channel SONET/SDH interface.

On a 2-port or 4–port Channelized OC3 IQE PIC, you can configure two to four separate OC3 clear-channel interfaces by additionally specifying the port numbers. Configuration is otherwise the same as previously described on a (1-port) Channelized OC3 IQ PIC.

Related Documentation

- *Channelized Interfaces Feature Guide for Routing Devices*

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Configuring T3 Interfaces on IQ and IQE Interfaces

To configure a T3 interface on an OC3 PIC, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc3-*fpc/pic/port*]** hierarchy level, specifying the **coc1** interface type:

```
[edit interfaces coc3-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type coc1;
```

When you include the **partition** statement at the **[edit interfaces coc3-*fpc/pic/port*]** hierarchy level, the only configurable interface type is **coc1**. This configuration creates interface **coc1-*fpc/pic/port*:*channel***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can only apply CoS rules to the aggregate bit streams.

Then, include the **no-partition interface-type** statement at the **[edit interfaces coc1-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **t3** interface type:

```
[edit interfaces coc1-fpc/pic/port:channel]
no-partition interface-type t3;
```

This configuration creates interface **t3-*fpc/pic/port*:*channel***.

Example: Configuring T3 Interfaces

Configure a T3 interface using partition 3 and OC slice 3. This configuration creates interface **t3-1/1/0:3**.

```
[edit interfaces coc3-1/1/0]
partition 3 oc-slice 3 interface-type coc1;
[edit interfaces coc1-1/1/0:3]
no-partition interface-type t3;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Related Documentation

- *Channelized Interfaces Feature Guide for Routing Devices*

Configuring T1 and NxDS0 Interfaces

To configure T1 interfaces on a Channelized OC3 IQ or IQE PIC, perform the following tasks:

1. Partition the channelized OC3 interface into channelized OC1 interfaces by including the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc3-*fpc/pic/port*]** hierarchy level, specifying the **coc1** interface type:

   ```
   [edit interfaces coc3-fpc/pic/port]
   partition partition-number oc-slice oc-slice-range interface-type coc1;
   ```


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2. If your network equipment uses VT mapping, partition the channelized OC1 interface into T1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces coc1-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **t1** interface type:

   ```
   [edit interfaces coc1-fpc/pic/port:channel]
   partition partition-number interface-type t1;
   ```

3. If your network equipment uses M13 or C-bit parity, convert the channelized OC1 interface into a channelized T3 interface by including the **no-partition** and **interface-type** statements at the **[edit interfaces coc1-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **ct3** interface type:

   ```
   [edit interfaces coc1-fpc/pic/port:channel]
   no-partition partition-number interface-type ct3;
   ```

   NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can only apply CoS rules to the aggregate bit streams.

   Note that because the **no-partition** statement is included, this configuration does not create another level of channelization, as denoted by the number of colons in the resulting interface.

4. To configure T1 interfaces, partition the channelized T3 interface into T1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces ct3-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **t1** interface type:

   ```
   [edit interfaces ct3-fpc/pic/port:channel]
   partition partition-number interface-type t1;
   ```

5. To configure *N*xDS0 interfaces, partition the channelized T3 interface into channelized T1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces ct3-*fpc/pic/port*:*channel*]** hierarchy level and specifying the **ct1** interface type:

   ```
   [edit interfaces ct3-fpc/pic/port:channel]
   partition partition-number interface-type ct1;
   ```

   NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can only apply CoS rules to the aggregate bit streams.

   Figure 25 on page 128 shows VT-mapped and M13 or C-bit parity-mapped configurations of T1 IQ interfaces.

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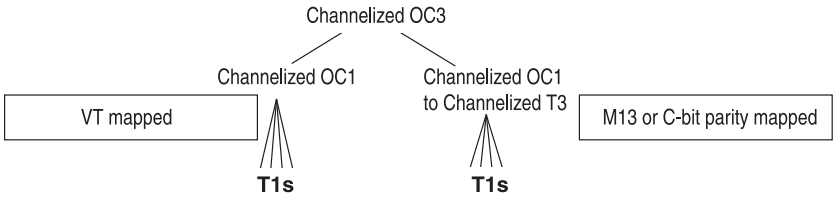
Figure 25: T1 Interfaces on a Channelized OC3 PIC



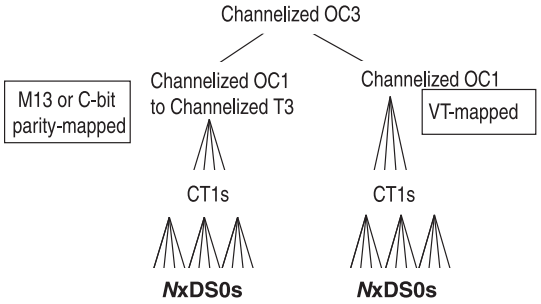
Bold entries correspond to actual packet channels.

6. Configure channelized *N*xDS0 IQ interfaces on the channelized T1 IQ interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces ct1-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **ds** interface type:

```
[edit interfaces ct1-fpc/pic/port:channel]
partition partition-number timeslots time-slot-range interface-type ds;
```

Figure 26 on page 128 shows VT-mapped and M13 or C-bit parity-mapped configurations of *N*xDS0 IQ interfaces.

Figure 26: Sample Channelization of OC3 IQ or IQE PIC



Bold entries correspond to actual packet channels.

Example: Configuring T1 and NxDS0 Interfaces

Configure the following T1 interfaces:

```
t1-0/0/0:1:1
t1-0/0/0:1:2
t1-0/0/0:1:3
t1-0/0/0:1:4
t1-0/0/0:1:5
```

VT-Mapped Configuration

```
[edit interfaces coc3-0/0/0]
partition 1 oc-slice 1 interface-type coc1;
[edit interfaces coc1-0/0/0:1]
partition 1-5 interface-type t1;
```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M13 or C-bit Parity-Mapped Configuration

```
[edit interfaces coc3-0/0/0]
partition 1 oc-slice 1 interface-type coc1;
[edit interfaces coc1-0/0/0:1]
no-partition interface-type ct3;
[edit interfaces ct3-0/0/0:1]
partition 1-5 interface-type t1;
```

Configure the following two *N*xDS0 interfaces with 10 time slots and 4 time slots, respectively:

```
ds-0/0/0:1:2:1
ds-0/0/0:1:2:2
```

VT-Mapped Configuration

```
[edit interfaces coc3-0/0/0]
partition 1 oc-slice 1 interface-type coc1;
[edit interfaces coc1-0/0/0:1]
partition 2 interface-type ct1;
[edit interfaces ct1-0/0/0:1:2]
partition 1 timeslots 1-10 interface-type ds;
partition 2 timeslots 12-16 interface-type ds;
```

M13 or C-bit Parity-Mapped Configuration

```
[edit interfaces coc3-0/0/0]
partition 1 oc-slice 1 interface-type coc1;
[edit interfaces coc1-0/0/0:1]
no-partition interface-type ct3;
[edit interfaces ct3-0/0/0:1]
partition 2 interface-type ct1;
[edit interfaces ct1-0/0/0:1:2]
partition 1 timeslots 1-10 interface-type ds;
partition 2 timeslots 12-16 interface-type ds;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Example: Setting Remote Loopback and Running BERT Tests on NxDS0 Interfaces

For Channelized OC3 IQ and IQE PICs, if you need remote loopback on a far-end *N*xDS0 interface, and you are running a BERT test from the local *N*xDS0 interface, you must set remote loopback on the far-end router's associated channelized T1 interface (**ct1**). To do this, include the **loopback remote** statement at the **[edit interfaces ct1-*fpc/picport* t1-options]** hierarchy level. For example:

Local router:

```
[edit interfaces]
ct1-0/0/0:2:2 {
   partition 1 timeslots 1-10 interface-type ds;
   ds-0/0/0:2:2:1 {
      ds0-options {
         bert-period 30;
      }
   }
}
```

Remote router:

```
[edit interfaces]
```

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```
ct1-0/0/0:2:2 {
  partition 1 timeslots 1-10 interface-type ds;
  t1-options {
    loopback remote;
  }
}
```

Related Documentation

- *Channelized Interfaces Feature Guide for Routing Devices*

Configuring Fractional T1 IQ Interfaces

By default, all the time slots on a channelized T1 interface are used. To configure a fractional T1 interface on a Channelized OC3 IQ or IQE PIC, you must perform the following tasks:

1. Configure a T1 interface on the Channelized OC3 IQ or IQE PIC. For more information, see "Configuring T1 and NxDS0 Interfaces" on page 126.
2. Configure the number of time slots allocated to the T1 IQ interface by including the **timeslots** statement at the **[edit interfaces t1-*fpc/pic/port*<:*channel*> t1-options]** hierarchy level:

   ```
   [edit interfaces t1-fpc/pic/port<:channel> t1-options]
   timeslots time-slot-range;
   ```

For channelized T1 IQ interfaces, the time-slot range is from 1 through 24. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces. For more information, see *Configuring Fractional T1 Time Slots*.

Example: Configuring Fractional T1 IQ Interfaces

Configure a fractional T1 interface that uses time slots 1 through 5 and 10:

```
[edit interfaces coc3-0/0/0]
partition 1 oc-slice 1 interface-type coc1;
[edit interfaces coc1-0/0/0:1]
partition 1 interface-type t1;
[edit interfaces t1-0/0/0:1:1 t1-options]
timeslots 1-5,10;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Related Documentation

- *Channelized Interfaces Feature Guide for Routing Devices*

Configuring Link PIC Failover on Channelized OC3 IQ and IQE Interfaces

For Channelized OC3 IQ or IQE PICs used as linking PICs in redundant LSQ configurations, you can inhibit the router from sending PPP termination-request messages to the remote host if the link PIC fails. To do this, include the **no-termination-request** statement at the **[edit interfaces *interface-name* ppp-options]** hierarchy level:

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no-termination-request;

The **no-termination-request** statement is supported only with MLPPP and SONET APS configurations and works with PPP, PPP over Frame Relay, and MLPPP interfaces only.

For information about interchassis and intrachassis LSQ failover, see the *Junos OS Services Interfaces Library for Routing Devices*.

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CHAPTER 6

Configuring Channelized OC12/STM4 Interfaces

- Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 133
- Channelization of OC12 PIC (SONET Mode) on page 133
- Configuring Channelized OC12 Interfaces on page 134
- Channelization of OC12/STM4 IQ and Channelized OC12/STM4 IQE PICs (SONET Mode) on page 137
- Configuring Channelized OC12/STM4 IQ and IQE Interfaces (SONET Mode) on page 138
- Channelization of OC12/STM4 IQE PIC (SDH Mode) on page 145
- Configuring Channelized OC12/STM4 IQE Interfaces (SDH Mode) on page 146
- Channelization of OC12/STM4 IQ PIC (SDH Mode) on page 151
- Configuring Channelized OC12/STM4 IQ Interfaces (SDH Mode) on page 152
- Example: Configuring a Channelized OC12 IQ Interface as an Unpartitioned Clear Channel on page 158
- Example: Configuring Channelized OC12 Interfaces with Partitioned Channels on page 162
- Configuring Link PIC Failover on Channelized OC12/STM4 IQ and IQE Interfaces on page 163

Channelized OC12/STM4 IQ and IQE Interfaces Overview

Channelized IQ and channelized IQE interfaces allow arbitrary and dynamic channelization of serial links, allowing greater flexibility than the channelized interfaces. Channelized OC12/STM4 IQ and IQE Physical Interface Cards (PICs) can be configured to operate in SONET or SDH mode. Each physical port on a multiple-port IQE PIC can be configured to operate in either SONET or SDH mode for increased granularity. The following sections describe the different modes of operation and channelization possibilities.

Related Documentation

- Channelized Interfaces Overview on page 3

Channelization of OC12 PIC (SONET Mode)

OC12 PICs can be configured to various smaller partitions, such as T3s.

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Figure 27: Sample Channelization of OC12 PIC (non IQ and IQE)

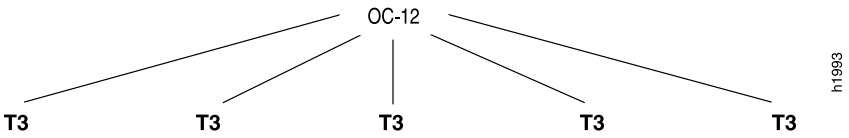

Figure 27 on page 134 shows five T3 channels configured on the Channelized OC12 PIC. You can configure seven additional T3 channels. For more information about configuring Channelized OC12 PICs, see "Configuring Channelized OC12 Interfaces" on page 134.

Configuring Channelized OC12 Interfaces

On Channelized OC12 PICs, you can configure 12 T3 channels per port. To configure channelized OC12 interface properties, you can include the **sonet-options** and **t3-options** statements at the **[edit interfaces *interface-name*]** hierarchy level. Some SONET/SDH options are ignored, and some can only be configured for channel 0, though they apply equally to all channels. The **long-buildout** statement under **t3-options** is also ignored.

For T3 channels on a channelized OC12 interface, the **clocking** statement is supported only for channel 0; it is ignored if included in the configuration of channels 1 through 11. The clock source configured for channel 0 applies to all channels on the channelized OC12 interface. The individual T3 channels use a gapped 45-MHz clock as the transmit clock. When you configure the clock source for a channelized interface—**ds-*fpc/pic/port*:0**, for example—you must also include the **channel-group** statement at the **[edit chassis]** hierarchy level and specify channel group 0. For more information, see "Clock Sources on Channelized Interfaces" on page 8.

For more information, see *SONET/SDH Interfaces Overview* and *T3 Interfaces Overview*. For a configuration example, see *Configuring Aggregated SONET/SDH Interfaces*.

Table 17 on page 134 summarizes the OC12-to-DS3 numbering scheme.

Table 17: OC12-to-DS3 Numbering Scheme

Two-Level STS-1 Number (STS-3,STS-1)	One-Level STS Number	OC12-to-DS3 PIC DS3 Number
1,1	1	0
1,2	2	1
1,3	3	2
2,1	4	3
2,2	5	4
2,3	6	5
3,1	7	6

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Table 17: OC12-to-DS3 Numbering Scheme *(continued)*

Two-Level STS-1 Number (STS-3,STS-1)	One-Level STS Number	OC12-to-DS3 PIC DS3 Number
3,2	8	7
3,3	9	8
4,1	10	9
4,2	11	10
4,3	12	11

Example: Configuring Channelized OC12 Interfaces

The following configuration is sufficient to get the channelized OC12 interface up and running. The OC12 interface can be divided into 12 channels. DS3 channels can use the following encapsulation types:

- PPP, PPP CCC, and PPP TCC
- Frame Relay, Frame Relay CCC, and Frame Relay TCC
- Cisco HDLC, Cisco HDLC CCC, and Cisco HDLC TCC

The channels can also have logical interfaces.

```
[edit interfaces]
t3-fpc/pic/port:0 {
    encapsulation cisco-hdlc;
    t3-options {
        compatibility-mode larscom;
        payload-scrambler;
    }
    unit 0 {
        family inet {
            address 10.11.30.1/30;
        }
        family iso;
    }
}
t3-fpc/pic/port:1 {
    encapsulation ppp;
    t3-options {
        compatibility-mode larscom;
        payload-scrambler;
    }
    unit 0 {
        family inet {
            address 10.11.30.5/30;
        }
        family iso;
    }
```

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```
}
t3-fpc/pic/port:2 {
  encapsulation frame-relay;
  t3-options {
    compatibility-mode larscom;
    payload-scrambler;
  }
  unit 0 {
    dlci 100;
    family inet {
      address 10.11.30.9/30;
    }
    family iso;
  }
  unit 1 {
    dlci 101;
    family inet {
      address 10.11.31.9/30;
    }
    family iso;
  }
}
t3-1fpc/pic/port:3 {
  encapsulation cisco-hdlc-ccc;
  t3-options {
    compatibility-mode larscom;
    payload-scrambler;
  }
  unit 0;
}
t3-fpc/pic/port:4 {
  encapsulation ppp-ccc;
  t3-options {
    compatibility-mode larscom;
    payload-scrambler;
  }
  unit 0;
}
t3-fpc/pic/port:5 {
  dce;
  encapsulation frame-relay-ccc;
  t3-options {
    compatibility-mode larscom;
    payload-scrambler;
  }
  unit 0 {
    encapsulation frame-relay-ccc;
    dlci 1000;
  }
  unit 1 {
    encapsulation frame-relay-ccc;
    dlci 1001;
  }
}
```


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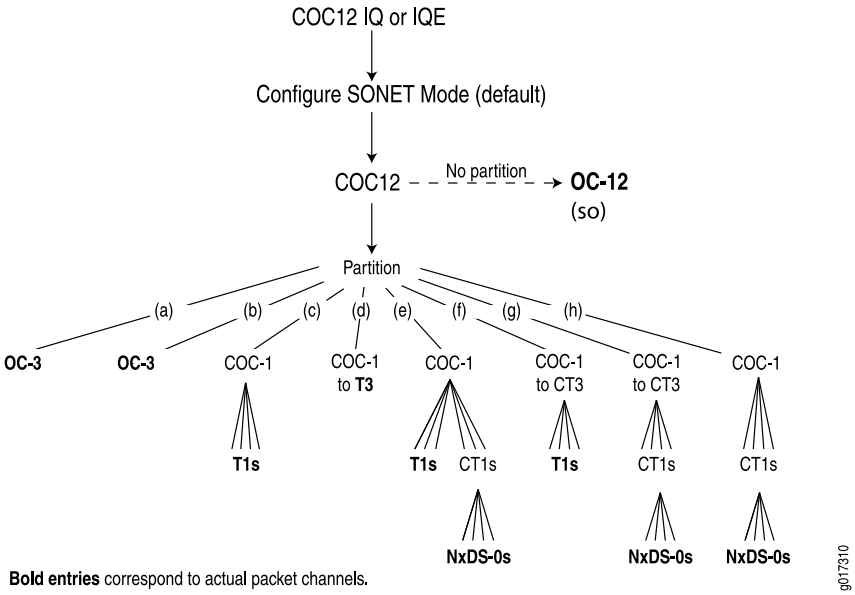
Channelization of OC12/STM4 IQ and Channelized OC12/STM4 IQE PICs (SONET Mode)

Channelized OC12/STM4 IQ PICs and Channelized OC12/STM4 IQE PICs can be configured to operate in SONET or SDH mode and partitioned into various partitions. Figure 28 on page 137 illustrates one possible channelization configuration for Channelized OC12/STM4 IQ and IQE PICs operating in SONET mode.

Figure 28: Sample Channelization of OC12/STM4 IQ or IQE PIC (SONET Mode)



In the example in Figure 28 on page 137, a Channelized OC12/STM4 IQ or IQE PIC operating in SONET mode is partitioned into the following OC slices:

a. An OC3 interface.

b. Another OC3 interface.

c. A channelized OC1 partitioned into T1 interfaces.

d. A channelized OC1 converted into a T3 interface.

e. A channelized OC1 partitioned into T1 interfaces and channelized T1s, which are partitioned into NxDS0 interfaces.

f. A channelized OC1 converted into a channelized T3, which is partitioned into T1 interfaces.

g. A channelized OC1 converted into a channelized T3, which is partitioned into T1 interfaces and a channelized T1, which is partitioned into NxDS0 interfaces.

h. A channelized OC1 partitioned into channelized T1s, which are partitioned into NxDS0 interfaces.

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Related Documentation

- Example: Channelized OC3 IQ Interface Configuration on page 83

Configuring Channelized OC12/STM4 IQ and IQE Interfaces (SONET Mode)

This section describes how to configure channelized OC12/STM4 intelligent queuing (IQ) and enhanced intelligent queuing (IQE) interfaces, discussing the following topics:

- Configuring an OC12/STM4 Interface on page 138
- Configuring T3 Interfaces on page 138
- Configuring OC3 Interfaces on page 140
- Configuring T1 Interfaces on Channelized OC12 IQ and IQE Interfaces on page 141
- Configuring NxDS0 Interfaces on page 142
- Configuring Fractional T1 Interfaces on page 144

Configuring an OC12/STM4 Interface

You can configure one OC12 interface on a 1-port Channelized OC12/STM4 IQ or IQE PIC. On a 4-port OC12/STM4 IQ or IQE PIC, you can configure one OC12 interface per port. To configure an OC12 interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces coc12-*fpc/pic/port*]** hierarchy level:

```
[edit interfaces coc12-fpc/pic/port]
no-partition interface-type (Interfaces) so;
```

This configuration creates interface **so-*fpc/pic/port***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ and IQE interfaces. You can apply CoS rules only to the aggregate bit streams.

NOTE: If you configure the **per-unit-scheduler** statement on the physical interface of a 4-port Channelized OC-12 IQ PIC and configure 975 logical interfaces or DLCIs, some of the logical interfaces or data link connection identifiers (DLCIs) will drop all packets intermittently.

Configuring T3 Interfaces

To configure a T3 interface on an OC12 PIC, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc12-*fpc/pic/port*]** hierarchy level, specifying the **coc1** interface type:

```
[edit interfaces coc12-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type (Interfaces) coc1;
```

This configuration creates interface **coc1-*fpc/pic/port*:*channel***.

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Then, include the **no-partition interface-type** statement at the **[edit interfaces coc1-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **t3** interface type:

```
[edit interfaces coc1-fpc/pic/port:channel]
no-partition interface-type (Interfaces) t3;
```

This configuration creates interface **t3-*fpc/pic/port*:*channel***.

The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized OC1 interfaces, the partition number can be from 1 through 12.

NOTE: For channelized OC12 interfaces, channel numbering begins with 0 (:0). For channelized OC12/STM4 IQ and IQE interfaces, channel numbering begins with 1 (:1).

The OC-slice range is the range of SONET/SDH slices. For SONET/SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. For channelized OC1 interfaces, the OC slice can be from 1 through 12. You can configure only one OC slice per channelized OC1 interface.

The interface type is the channelized interface type or clear channel you are creating. For channelized OC12 interfaces, ***type*** can be **so** or **coc1**.

NOTE: Channelized OC12/STM4 IQ and IQE interfaces in M Series, MX Series, and T Series routers reserve channels 0 through 3 of each OC12 space for STS3c SONET channels.

When you configure E3 or T3 channels in OC12 spaces on the described PICs, Junos OS allocates them starting from channel 4 because channels 0 through 3 are reserved for four STS3c SONET channels. Channel numbers are allocated sequentially in the following order: 4, 5, 6, 7, 8, 9, 11, 0, 1, 2, 3.

Only after channels 4 through 11 of the OC12 space are exhausted (that is, channels 4 through 11 are configured) for E3 or T3 channels will Junos OS then allocate the channel 0–3 space for further E3 or T3 channels; thereby using up the 0–3 space previously reserved for four STS3c SONET channels.

If a subsequent reconfiguration of this OC12 space occurs, where you try to replace channels 4–6 or 7–9 with an OC3 SONET channel; it fails because the channel 0–3 space is already occupied by the last E3 or T3 channels configured. This causes a failure in channel allocation and the device control daemon (dcd) keeps retrying forever to configure the channel allocation on the interface. The only resolution is to reconfigure the last configured E3 or T3 channels with OC3 channels, to free channels 0 through 3.

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Example: Configuring T3 Interfaces

Configure a T3 interface using partition 3 and OC slice 3. This configuration creates interface **t3-1/1/0:3**:

```
[edit interfaces coc12-1/1/0]
partition 3 oc-slice 3 interface-type coc1;
[edit interfaces coc1-1/1/0:3]
no-partition interface-type t3;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring OC3 Interfaces

To configure an OC3 interface, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc12-*fpc/pic/port*]** hierarchy level, specifying the **so** interface type:

```
[edit interfaces coc12-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type (Interfaces) so;
```

The partition number is the sublevel interface partition index. For SONET/SDH interfaces, the partition number does not correlate with bandwidth size. For OC3 interfaces, the partition number can be from 1 through 4.

NOTE: For channelized OC12 interfaces, channel numbering begins with 0 (:0). For channelized OC12 IQ and IQE interfaces, channel numbering begins with 1 (:1).

The OC-slice range is the range of SONET/SDH slices. For SONET/SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. OC3 interfaces must occupy three consecutive OC slices per interface, in one of the following forms:

- 1–3
- 4–6
- 7–9
- 10–12

By contrast, the T3 and OC1 IQ interfaces each occupy one OC slice per interface.

The interface type is the channelized interface type or data channel you are creating. For channelized OC12 interfaces, the interface type can be **coc1** or **so**.

Example: Configuring OC3 Interfaces

Configure an OC3 interface, using partition 1 and OC slices 4 through 6. This configuration creates interface **so-1/1/0:1**:

```
[edit interfaces coc12-1/1/0]
partition 1 oc-slice 4-6 interface-type so;
```


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For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring T1 Interfaces on Channelized OC12 IQ and IQE Interfaces

To configure T1 interfaces on a Channelized OC12 IQ or IQE PIC, perform the following tasks:

1. Partition the channelized OC12 interface into channelized OC1 interfaces by including the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc12-*fpc/pic/port*]** hierarchy level, specifying the **coc1** interface type:

   [edit interfaces coc12-*fpc/pic/port*]
   partition *partition-number* oc-slice *oc-slice-range* interface-type (Interfaces) coc1;

2. If your network equipment uses virtual tributary (VT) mapping, partition the channelized OC1 interface into T1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces coc1-*fpc/pic/port*]** hierarchy level, specifying the **t1** interface type:

   [edit interfaces coc1-*fpc/pic/port*]
   partition *partition-number* interface-type (Interfaces) t1;

3. If your network equipment uses M13 or C-bit parity, convert the channelized OC1 interface into a channelized T3 interface by including the **no-partition** and **interface-type** statements at the **[edit interfaces coc1-*fpc/pic/port:channel*]** hierarchy level, specifying the **ct3** interface type. Note that because the **no-partition** statement is included, this configuration does not create another level of channelization, as denoted by the number of colons in the resulting interface.

   [edit interfaces coc1-*fpc/pic/port*]
   no-partition *partition-number* interface-type (Interfaces) ct3;

4. Partition the channelized T3 interface into T1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces ct3-*fpc/pic/port*]** hierarchy level, specifying the **t1** interface type:

   [edit interfaces ct3-*fpc/pic/port*]
   partition *partition-number* interface-type (Interfaces) t1;

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can apply CoS rules only to the aggregate bit streams.

Figure 29 on page 142 shows VT-mapped and M13 or C-bit parity-mapped configurations of T1 interfaces.

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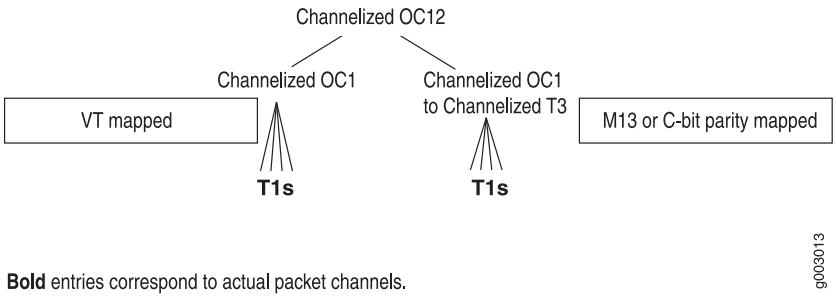
Figure 29: T1 Interfaces on a Channelized OC12 PIC



Bold entries correspond to actual packet channels.

Example: Configuring T1 Interfaces

Configure the following T1 interfaces:

t1-0/0/0:1:1
t1-0/0/0:1:2
t1-0/0/0:1:3
t1-0/0/0:1:4
t1-0/0/0:1:5

VT-Mapped Configuration

```
[edit interfaces coc12-0/0/0]
partition 1 oc-slice 1 interface-type coc1;

[edit interfaces coc1-0/0/0:1]
partition 1-5 interface-type t1;
```

M13 or C-bit Parity-Mapped Configuration

```
[edit interfaces coc12-0/0/0]
partition 1 oc-slice 1 interface-type coc1;

[edit interfaces coc1-0/0/0:1]
no-partition interface-type ct3;

[edit interfaces ct3-0/0/0:1]
partition 1-5 interface-type t1;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring NxDS0 Interfaces

To configure *N*xDS0 interfaces on a Channelized OC12 IQE PIC, perform the following tasks:

1. Partition the channelized OC12 IQE interface into channelized OC1 interfaces by including the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc12-*fpc/pic/port*]** hierarchy level, specifying the **coc1** interface type:

   [edit interfaces coc12-*fpc/pic/port*]
   partition *partition-number* oc-slice *oc-slice-range* interface-type (Interfaces) coc1;

2. If your network equipment uses VT mapping, partition the channelized OC1 interface into channelized T1 interfaces by including the **partition** and **interface-type** statements

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at the **[edit interfaces coc1-*fpc/pic/port*]** hierarchy level, specifying the **ct1** interface type:

```
[edit interfaces coc1-fpc/pic/port]
partition partition-number interface-type (Interfaces) ct1;
```

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can apply CoS rules only to the aggregate bit streams.

3. If your network equipment uses M13 or C-bit parity, convert the channelized OC1 interface into a channelized T3 interface by including the **no-partition** and **interface-type** statements at the **[edit interfaces coc1-*fpc/pic/port*]** hierarchy level, specifying the **ct3** interface type:

   ```
   [edit interfaces coc1-fpc/pic/port]
   no-partition partition-number interface-type (Interfaces) ct3;
   ```

   NOTE: Because the **no-partition** statement is included, this configuration task does not create another level of channelization, as denoted by the number of colons in the resulting interface.

4. Partition the channelized T3 interface into channelized T1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces ct3-*fpc/pic/port*]** hierarchy level, specifying the **ct1** interface type:

   ```
   [edit interfaces ct3-fpc/pic/port]
   partition partition-number interface-type (Interfaces) ct1;
   ```

5. Configure channelized *N*xDS0 IQ interfaces on the channelized T1 IQ interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level, specifying the **ds** interface type:

   ```
   [edit interfaces ct1-fpc/pic/port:channel:channel]
   partition partition-number timeslots time-slot-range interface-type (Interfaces) ds;
   ```

Figure 30 on page 144 shows VT-mapped and M13 or C-bit parity-mapped configurations of *N*xDS0 IQ interfaces.

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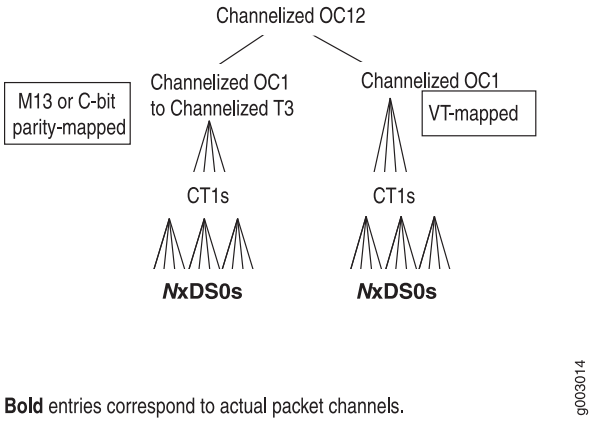
Figure 30: Sample Channelization of OC12 IQE PIC



Bold entries correspond to actual packet channels.

Example: Configuring NxDS0 Interfaces

Configure the following two *N*xDS0 interfaces with 10 time slots and 4 time slots, respectively:

ds-0/0/0:1:2:1
ds-0/0/0:1:2:2

VT-Mapped Configuration

```
[edit interfaces coc12-0/0/0]
partition 1 oc-slice 1 interface-type coc1;

[edit interfaces coc1-0/0/0:1]
partition 2 interface-type ct1;

[edit interfaces ct1-0/0/0:1:2]
partition 1 timeslots 1-10 interface-type ds;
partition 2 timeslots 12-16 interface-type ds;
```

M13 or C-bit Parity-Mapped Configuration

```
[edit interfaces coc12-0/0/0]
partition 1 oc-slice 1 interface-type coc1;

[edit interfaces coc1-0/0/0:1]
no-partition interface-type ct3;

[edit interfaces ct3-0/0/0:1]
partition 2 interface-type ct1;

[edit interfaces ct1-0/0/0:1:2]
partition 1 timeslots 1-10 interface-type ds;
partition 2 timeslots 12-16 interface-type ds;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring Fractional T1 Interfaces

By default, all the time slots on a channelized T1 interface are used. To configure a fractional T1 interface on a Channelized OC12 IQE PIC, perform the following tasks:

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1. Configure a T1 interface. For more information, see "Configuring T1 Interfaces" on page 170.
2. Configure the number of time slots allocated to the T1 interface by including the **timeslots** statement at the **[edit interfaces t1-*fpc/pic/port*<:*channel*> t1-options]** hierarchy level:

```
[edit interfaces t1-fpc/pic/port<:channel> t1-options]
timeslots time-slot-range;
```

For channelized T1 interfaces, the time-slot range is from 1 through 24. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces. For more information, see *Configuring Fractional T1 Time Slots*.

Example: Configuring Fractional T1 Interfaces

Configure a fractional T1 interface that uses time slots 1 through 5 and 10:

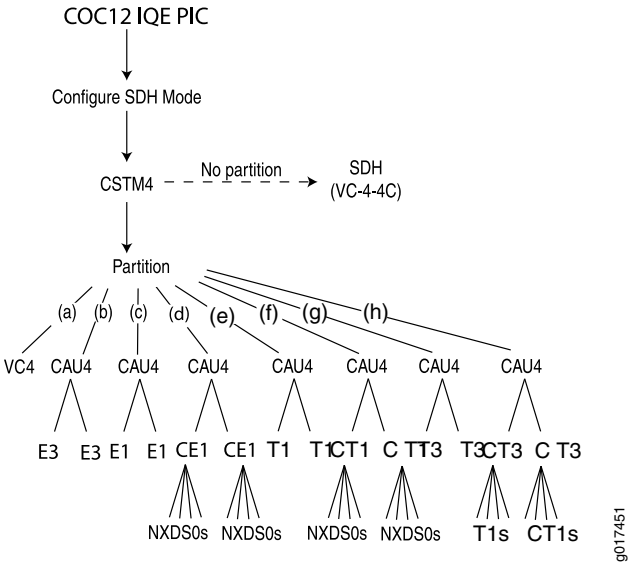
```
[edit interfaces coc12-0/0/0]
partition 1 oc-slice 1 interface-type coc1;
[edit interfaces coc1-0/0/0:1]
partition 1 interface-type t1;
[edit interfaces t1-0/0/0:1:1 t1-options]
timeslots 1-5,10;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Channelization of OC12/STM4 IQE PIC (SDH Mode)

Channelized OC12/STM4 IQE PICs can be configured to operate in SONET or SDH mode and partitioned to various smaller partitions. Figure 31 on page 145 illustrates one possible channelization configuration for Channelized OC12/STM4 IQE PICs operating in SDH mode.

Figure 31: Sample Channelization of OC12/STM4 IQE PIC (SDH Mode)



In Figure 31 on page 145, a Channelized OC12/STM4 IQE PIC operating in SDH mode results in a channelized STM4 interface, which can be nonpartitioned into one SDH VC-4-VC interface or partitioned into the following OC slices:

a. An SDH VC-4 interface.

b. A channelized AU-4 partitioned into E3 interfaces.

c. A channelized AU-4 interface partitioned into E1 interfaces.

d. A channelized AU-4 interface partitioned into CE1 interfaces partitioned into *N*xDS0 interfaces.

e. A channelized AU-4 interface partitioned into T1 interfaces.

f. A channelized AU-4 interface partitioned into CT1 interfaces.

g. A channelized AU-4 interface partitioned into T3 interfaces partitioned into T1 interfaces.

h. A channelized AU-4 interface partitioned into CT3 interfaces partitioned into CT1 interfaces.

This is one of thousands of ways to configure a Channelized OC12/STM4 IQE PIC.

Related Documentation

- Example: Complex Configuration for a Channelized OC12 IQ Interface on page 56

Configuring Channelized OC12/STM4 IQE Interfaces (SDH Mode)

The Channelized OC12 IQE PIC configured for SDH mode creates a single channelized STM4 interface. You can configure this interface as unpartitioned using the **no-partition** statement at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level to create a single SDH VC-4-4C interface, or you can partition it into the following OC slices:

- SDH virtual concatenation 4 (VC-4) and channelized AU-4 interfaces (4 interfaces, any combination)
- E3 interfaces from a channelized AU-4 interface (3 interfaces, any combination)
- Channelized E1 or E1 interfaces from a channelized AU-4 interface (63 interfaces, any combination)
- *N*xDS0 interfaces from a channelized E1 interface

This section describes how to configure the following channelized OC12 IQE interfaces on a Channelized OC12 IQE PIC configured in SDH mode:

- Configuring Channelized OC12/STM4 IQE PICs for SDH Mode on page 147
- Configuring an Unpartitioned SDH (VC-4-4C) Interface on a Channelized OC12/STM4 IQE PIC on page 147
- Configuring SDH (VC-4) Interfaces on Channelized OC12/STM4 IQE PICs on page 148
- Configuring Channelized AU-4 Interfaces on page 148
- Configuring E3 Interfaces on page 149

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- Configuring E1 or Channelized E1 Interfaces on page 150
- Configuring NxDS0 Interfaces on Channelized OC12/STM4 IQE PICs on page 151

Configuring Channelized OC12/STM4 IQE PICs for SDH Mode

The 4-port Channelized OC12 IQE PIC allows SONET/SDH configuration on a per port basis, permitting combinations of SONET and SDH ports on the same PIC. The 1-port Channelized OC12 IQE PIC operates in either SONET or SDH mode only.

To configure a 1-port Channelized OC12 IQE PIC to operate in SDH mode, include the **framing sdh** statement at the **[edit chassis fpc *fpc/pic/port*]** hierarchy level:

```
[edit chassis]
fpc 0 {
  pic 2 {
    framing sdh;
  }
}
```

This configuration creates interface **cstm4-0/2/0**.

You can also use the above configuration example to configure all 4 ports of a 4-port Channelized OC12 IQE PIC for SDH mode. To configure individual ports to operate in SDH mode, include the **framing sdh** statement at the **[edit chassis fpc *fpc/pic/port*]** hierarchy level. The following example configures port 2 for SDH mode:

```
[edit chassis]
fpc 0 {
  pic 2 {
    port 2 {
      framing sdh;
    }
  }
}
```

This configuration creates interface **cstm4-0/2/2**.

For more information, see the *Junos OS Administration Library for Routing Devices*.

Configuring an Unpartitioned SDH (VC-4-4C) Interface on a Channelized OC12/STM4 IQE PIC

On a Channelized OC12 IQE PIC, you can configure one SDH (VC-4-4C) interface. To configure an SDH (VC-4-4C) interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level:

```
[edit interfaces cstm4-fpc/pic/port]
no-partition interface-type (Interfaces) so;
```

This configuration creates interface **so-*fpc/pic/port***.

Example: Configuring an Unpartitioned SDH (VC-4-4C) Interface

Configure an unpartitioned SDH (VC-4-4C) interface, using partition 1 and OC slices 4 through 6:

```
[edit interfaces cstm4-0/2/0]
```

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```
no-partition interface-type so;
```

This configuration creates the interface **so-0/2/0**.

Configuring SDH (VC-4) Interfaces on Channelized OC12/STM4 IQE PICs

To configure an SDH (VC-4) interface on a Channelized OC12 IQE PIC, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level, specifying the **so** interface type:

```
[edit interfaces cstm4-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type (Interfaces) so;
```

This configuration creates interface **so-*fpc/pic/port*:*channel***.

The partition number is the sublevel interface partition index and is correlated with the channel number. For Channelized OC12 IQE PICs, the OC-slice range can be from 1 through 12.

NOTE: **For channelized OC12 IQE interfaces, channel numbering begins with 1 (:1).**

The OC-slice range is the range of SONET/SDH slices. For SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. SDH (VC-4) interfaces must occupy three consecutive OC slices per interface, in one of the following forms:

- 1–3
- 4–6
- 7–9
- 10–12

The interface type is the channelized interface type or data channel you are creating.

Example: Configuring SDH (VC-4) Interfaces

Configure SDH (VC-4) interfaces:

```
[edit interfaces cstm4-0/2/0]
partition 1 oc-slice 1-3 interface-type so;
partition 2 oc-slice 4-6 interface-type so;
partition 3 oc-slice 7-9 interface-type so;
partition 4 oc-slice 10-12 interface-type so;
```

This configuration creates the interfaces **so-0/2/0:1** through **so-0/2/0:4**.

Configuring Channelized AU-4 Interfaces

To configure a channelized AU-4 interface, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level, specifying the **cau4** interface type:

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```
[edit interfaces cstm4-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type (Interfaces) cau4;
```

This configuration creates interface **cau4-*fpc/pic/port*:*channel***.

The partition number is the sublevel interface partition index. For SDH interfaces, the partition number is not correlated with bandwidth size. A channelized STM-4 interface can have from 1 through 4 partition numbers.

NOTE: For channelized OC12 interfaces, channel numbering begins with 0 (:0). For channelized OC12 interfaces (both IQ and IQE), channel numbering begins with 1 (:1).

The OC-slice range is the range of SONET/SDH slices. For SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. Channelized AU-4 IQ interfaces must occupy three consecutive OC slices per interface, in one of the following forms:

- 1–3
- 4–6
- 7–9
- 10–12

The interface type is the channelized interface type or data channel you are creating.

Example: Configuring Channelized AU-4 Interfaces

Configure channelized AU-4 interfaces, using partitions 1 through 4:

```
[edit interfaces cstm4-0/2/0]
partition 1 oc-slice 1-3 interface-type cau4;
partition 2 oc-slice 4-6 interface-type cau4;
partition 3 oc-slice 7-9 interface-type cau4;
partition 4 oc-slice 10-12 interface-type cau4;
```

This configuration creates the interfaces **cau4-0/2/0:1** through **cau4-0/2/0:4**.

Configuring E3 Interfaces

To configure E3 interfaces, include the **partition** and **interface-type** statements at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level, specifying the **e3** interface type:

```
[edit interfaces]
cau4-fpc/pic/port {
    partition partition-number interface-type (Interfaces) e3;
}
```

This configuration creates the interfaces **e3-*fpc/pic/port*:*channel*** and **e3-*fpc/pic/port*:*channel***.

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NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQE interfaces. You can only apply CoS rules to the aggregate bit streams.

NOTE: Channelized OC12/STM4 IQ and IQE interfaces in M Series, MX Series, and T Series routers reserve channels 0-3 of each OC12 space for STS3C SONET channels.

When you configure E3 or T3 channels in OC12 spaces on the described PICs, Junos OS allocates them starting from channel 4 because channels 0-3 are reserved for four STS3c SONET channels. Channel numbers are allocated sequentially in the following order: 4, 5, 6, 7, 8, 9, 11, 0, 1, 2, 3.

Only after channels 4 through 11 of the OC12 space are exhausted (all 4 through 11 configured) for E3 or T3 channels will Junos OS then allocate channel 0-3 space for further E3 or T3 channels; thereby using up the 0-3 space previously reserved for four STS3c SONET channels.

If a subsequent reconfiguration of this OC12 space occurs, where you try to replace channels 4-6 or 7-9 with an OC3 SONET channel; it fails because the channel 0-3 space is already occupied by the last E3 or T3 channels configured. This causes a failure in channel allocation and the Device Control Daemon (DCD) keeps retrying forever to configure the channel allocation on the interface. The only resolution is to reconfigure the last configured E3/T3 channels with OC3 channels, to free channels 0-3.

Example: Configuring E3 Interfaces

Configure E3 interfaces, using partition 1:

```
[edit interfaces]
cau4-0/2/0:1 {
   partition 1 interface-type e3;
}
e3-0/2/0:1:1;
```

Configuring E1 or Channelized E1 Interfaces

To configure E1 or channelized E1 interfaces, include the **partition** and **interface-type** statements at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level, specifying the **e1** or **ce1** interface type:

```
[edit interfaces]
cau4-fpc/pic/port {
   partition partition-number interface-type (Interfaces) e1;
}
cau4-fpc/pic/port {
   partition partition-number interface-type (Interfaces) ce1;
}
```


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This configuration creates the interfaces **e1-*fpc/pic/port*:*channel*** and **ce1-*fpc/pic/port*:*channel***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQE interfaces. You can only apply CoS rules to the aggregate bit streams.

Example: Configuring E1 or Channelized CE1 Interfaces

Configure E1 or channelized CE1 interfaces, using partition 3 and partition 4:

```
[edit interfaces]
cau4-0/2/0:1 {
   partition 3 interface-type e1;
}
cau4-0/2/0:1 {
   partition 4 interface-type ce1;
}
```

This configuration creates interfaces **e1-0/2/0:1:3** and **ce1-0/2/0:1:4**.

Configuring NxDS0 Interfaces on Channelized OC12/STM4 IQE PICs

Configure channelized *N*xDS0 interfaces on the channelized E1 interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces ce1-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **ds** interface type:

```
[edit interfaces ce1-fpc/pic/port:channel:channel]
partition partition-number timeslots time-slot-range interface-type (Interfaces) ds;
```

This configuration creates the interface **ds-*fpc/pic/port*:*channel***.

The time-slot range is from 1 through 32. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. You can use a combination of ranges and discontinuous time slots, for example:

```
1,9-18,21
```

Example: Configuring NxDS0 Interfaces

Configure channelized *N*xDS0 interfaces, using partition 4 and time slots 1 through 10:

```
[edit interfaces]
ce1-0/2/0:1:2:3 {
   partition 4 interface-type ds0 timeslots 1-10;
}
```

This configuration creates interface **ds-0/2/0:1:2:4**.

Channelization of OC12/STM4 IQ PIC (SDH Mode)

Channelized OC12/STM4 IQ PICs can be configured to operate in SONET or SDH mode and partitioned into various smaller partitions. Figure 32 on page 152 illustrates one possible channelization configuration for Channelized OC12/STM4 IQ PICs operating in SDH mode.

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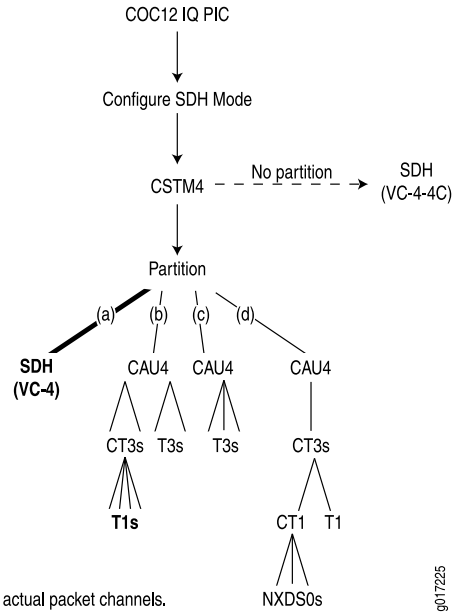
Figure 32: Sample Channelization of OC12/STM4 IQ PIC (SDH Mode)



Bold entries correspond to actual packet channels.

In Figure 32 on page 152, a Channelized OC12/STM4 IQ PIC operating in SDH mode results in a channelized STM4 interface, which can be nonpartitioned into one SDH VC-4-VC interface or partitioned into the following OC slices:

a. An SDH VC-4 interface.

b. A channelized AU-4 partitioned into channelized T3 interfaces and T3 interfaces.

c. Another channelized AU-4 interface converted into T3 interfaces.

d. Another channelized AU-4 interface converted into a channelized T3 interface, which is partitioned further into a channelized T1 and a T1 interface. The channelized T1 interface is further partitioned into *N*xDS0 interfaces.

This is one of thousands of ways to configure a Channelized OC12/STM4 IQ PIC.

Related Documentation

- Example: Complex Configuration for a Channelized OC12 IQ Interface on page 56

Configuring Channelized OC12/STM4 IQ Interfaces (SDH Mode)

The Channelized OC12 IQ PIC configured for SDH mode creates a single channelized STM4 interface. You can configure this interface as unpartitioned using the **no-partition** statement at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level to create a single SDH VC-4-4C interface, or you can partition it into the following OC slices:

- SDH virtual concatenation 4 (VC-4) and channelized AU-4 interfaces (4 interfaces, any combination)
- Channelized T3 or T3 interfaces from a channelized AU-4 interface (3 interfaces, any combination)

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- Channelized T1 or T1 interfaces from a channelized T3 interface (28 interfaces, any combination)
- *N*xDS0 interfaces from a channelized T1 interface

NOTE: If you configure the per-unit-scheduler statement on the physical interface of a 4-port channelized OC-12 IQ PIC and configure 975 logical interfaces or data link connection identifiers (DLCIs), some of the logical interfaces or DLCIs will drop all packets intermittently.

This section describes how to configure the following channelized OC12 IQ interfaces on a Channelized OC12 IQ PIC configured in SDH mode:

- Configuring Channelized OC12/STM4 IQ PICs for SDH Mode on page 153
- Configuring an Unpartitioned SDH (VC-4-4C) Interface on a Channelized OC12/STM4 IQ PIC on page 153
- Configuring SDH (VC-4) Interfaces on Channelized OC12/STM4 IQ PICs on page 154
- Configuring Channelized AU-4 Interfaces on page 155
- Configuring T3 or Channelized T3 Interfaces Under Channelized AU-4 Interfaces on page 155
- Configuring T1 or Channelized T1 Interfaces Under Channelized AU-4 Interfaces on page 156
- Configuring T1 or Channelized T1 Interfaces Under Channelized T3 Interfaces on page 157
- Configuring NxDS0 Interfaces on Channelized OC12/STM4 IQ PICs on page 158

Configuring Channelized OC12/STM4 IQ PICs for SDH Mode

To configure a Channelized OC12 IQ PIC to operate in SDH mode, include the **framing sdh** statement at the **[edit chassis fpc *fpc/pic/port*]** hierarchy level:

```
[edit chassis]
fpc 0 {
  pic 2 {
    framing sdh;
  }
}
```

This configuration creates interface **cstm4-0/2/0**.

For more information, see the *Junos OS Administration Library for Routing Devices*.

Configuring an Unpartitioned SDH (VC-4-4C) Interface on a Channelized OC12/STM4 IQ PIC

On a Channelized OC12 IQ PIC, you can configure one SDH (VC-4-4C) interface. To configure an SDH (VC-4-4C) interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level:

```
[edit interfaces cstm4-fpc/pic/port]
no-partition interface-type (Interfaces) so;
```

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This configuration creates interface **so-*fpc/pic/port***.

Example: Configuring an Unpartitioned SDH (VC-4-4C) Interface

Configure an unpartitioned SDH (VC-4-4C) interface, using partition 1 and OC slices 4 through 6:

```
[edit interfaces cstm4-0/2/0]
no-partition interface-type so;
```

This configuration creates the interface **so-0/2/0**.

Configuring SDH (VC-4) Interfaces on Channelized OC12/STM4 IQ PICs

To configure an SDH (VC-4) interface on a Channelized OC12 IQ PIC, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level, specifying the **so** interface type:

```
[edit interfaces cstm4-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type (Interfaces) so;
```

This configuration creates interface **so-*fpc/pic/port*:*channel***.

The partition number is the sublevel interface partition index and is correlated with the channel number. For Channelized OC12 IQ PICs, the OC-slice range can be from 1 through 12.

NOTE: For channelized OC12 IQ interfaces, channel numbering begins with 1 (:1).

The OC-slice range is the range of SONET/SDH slices. For SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. SDH (VC-4) interfaces must occupy three consecutive OC slices per interface, in one of the following forms:

- 1–3
- 4–6
- 7–9
- 10–12

The interface type is the channelized interface type or data channel you are creating.

Example: Configuring SDH (VC-4) Interfaces

Configure SDH (VC-4) interfaces:

```
[edit interfaces cstm4-0/2/0]
partition 1 oc-slice 1-3 interface-type so;
partition 2 oc-slice 4-6 interface-type so;
partition 3 oc-slice 7-9 interface-type so;
partition 4 oc-slice 10-12 interface-type so;
```


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This configuration creates the interfaces **so-0/2/0:1** through **so-0/2/0:4**.

Configuring Channelized AU-4 Interfaces

To configure a channelized AU-4 interface, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces cstm4-*fpc/pic/port*]** hierarchy level, specifying the **cau4** interface type:

```
[edit interfaces cstm4-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type (Interfaces) cau4;
```

This configuration creates interface **cau4-*fpc/pic/port*:*channel***.

The partition number is the sublevel interface partition index. For SDH interfaces, the partition number is not correlated with bandwidth size. A channelized STM-4 interface can have from 1 through 4 partition numbers.

NOTE: For channelized OC12 interfaces, channel numbering begins with 0 (:0). For channelized OC12 interfaces (both IQ and IQE), channel numbering begins with 1 (:1).

The OC-slice range is the range of SONET/SDH slices. For SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. Channelized AU-4 IQ interfaces must occupy three consecutive OC slices per interface, in one of the following forms:

- 1–3
- 4–6
- 7–9
- 10–12

The interface type is the channelized interface type or data channel you are creating.

Example: Configuring Channelized AU-4 Interfaces

Configure channelized AU-4 interfaces, using partitions 1 through 4:

```
[edit interfaces cstm4-0/2/0]
partition 1 oc-slice 1-3 interface-type cau4;
partition 2 oc-slice 4-6 interface-type cau4;
partition 3 oc-slice 7-9 interface-type cau4;
partition 4 oc-slice 10-12 interface-type cau4;
```

This configuration creates the interfaces **cau4-0/2/0:1** through **cau4-0/2/0:4**.

Configuring T3 or Channelized T3 Interfaces Under Channelized AU-4 Interfaces

To configure T3 or channelized T3 interfaces, include the **partition** and **interface-type** statements at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level, specifying the **t3** or **ct3** interface type:

```
[edit interfaces]
```

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```
cau4-fpc/pic/port {
  partition partition-number interface-type (Interfaces) t3;
}
cau4-fpc/pic/port {
  partition partition-number interface-type (Interfaces) ct3;
}
```

This configuration creates the interfaces **t3-*fpc/pic/port*:*channel*** and **ct3-*fpc/pic/port*:*channel***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can apply CoS rules only to the aggregate bit streams.

Example: Configuring T3 or Channelized T3 Interfaces

Configure T3 and channelized T3 interfaces, using partition 1 and partition 2:

```
[edit interfaces]
cau4-0/2/0:1 {
  partition 1 interface-type t3;
}
cau4-0/2/0:1 {
  partition 2 interface-type ct3;
}
t3-0/2/0:1:1 ct3-0/2/0:1:2;
```

Configuring T1 or Channelized T1 Interfaces Under Channelized AU-4 Interfaces

To configure T1 or channelized T1 interfaces under channelized AU-4 interfaces, include the **partition** and **interface-type** statements at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level, specifying the **t1** or **ct1** interface type:

```
[edit interfaces]
cau4-fpc/pic/port {
  partition partition-number interface-type (Interfaces) t1;
}
cau4-fpc/pic/port {
  partition partition-number interface-type (Interfaces) ct1;
}
```

This configuration creates the interfaces **t1-*fpc/pic/port*:*channel*** and **ct1-*fpc/pic/port*:*channel***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can apply CoS rules only to the aggregate bit streams.

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Example: Configuring T1 or Channelized T1 Interfaces Under Channelized AU-4 Interfaces

Configure T1 and channelized T1 interfaces, using partition 1 and partition 2:

```
[edit interfaces]
cau4-0/2/0:1 {
   partition 1 interface-type t1;
}
cau4-0/2/0:1 {
   partition 2 interface-type ct1;
}
t1-0/2/0:1:1 ct1-0/2/0:1:2;
```

Configuring T1 or Channelized T1 Interfaces Under Channelized T3 Interfaces

To configure T1 or channelized T1 interfaces under channelized T3 interfaces, include the **partition** and **interface-type** statements at the **[edit interfaces ct3-*fpc/pic/port*]** hierarchy level, specifying the **t1** or **ct1** interface type:

```
[edit interfaces]
ct3-fpc/pic/port {
   partition partition-number interface-type (Interfaces) t1;
}
ct3-fpc/pic/port {
   partition partition-number interface-type (Interfaces) ct1;
}
```

This configuration creates the interfaces **t1-*fpc/pic/port*:*channel*** and **ct1-*fpc/pic/port*:*channel***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can apply CoS rules only to the aggregate bit streams.

Example: Configuring T1 or Channelized T1 Interfaces Under Channelized T3 Interfaces

Configure T1 or channelized T1 interfaces, using partition 3 and partition 4:

```
[edit interfaces]
ct3-0/2/0:1:2 {
   partition 3 interface-type t1;
}
ct3-0/2/0:1:2 {
   partition 4 interface-type ct1;
}
```

This configuration creates interfaces **t1-0/2/0:1:2:3** and **ct1-0/2/0:1:2:4**.

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Configuring NxDS0 Interfaces on Channelized OC12/STM4 IQ PICs

Configure channelized *N*xDS0 IQ interfaces on the channelized T1 IQ interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces ct1-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **ds** interface type:

```
[edit interfaces ct1-fpc/pic/port:channel:channel]
partition partition-number timeslots time-slot-range interface-type (Interfaces) ds;
```

This configuration creates the interface **ds-*fpc/pic/port*:*channel***.

The time-slot range is from 1 through 24. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. You can use a combination of ranges and discontinuous time slots:

```
1,9-18,21
```

Example: Configuring NxDS0 Interfaces

Configure channelized *N*xDS0 interfaces, using partition 4 and time slots 1 through 10:

```
[edit interfaces]
ct1-0/2/0:1:2:3 {
   partition 4 interface-type ds0 timeslots 1-10;
}
```

This configuration creates interface **ds-0/2/0:1:2:3:4**.

Example: Configuring a Channelized OC12 IQ Interface as an Unpartitioned Clear Channel

Configuring a SONET/SDH Interface

Configure a channelized OC12 interface as an unpartitioned, clear channel:

```
[edit interfaces]
coc12-5/0/0 {
   no-partition interface-type so; # so-5/0/0
}
```

Configuring Multiple Interface Types

Configure the following interfaces on a Channelized OC12 IQ or IQE PIC:

a. An OC3 interface

b. Another OC3 interface

c. A channelized OC1 partitioned into T1 interfaces

d. A channelized OC1 converted into a T3 interface

e. A channelized OC1 partitioned into T1 interfaces and channelized T1s, which are partitioned into *N*xDS0 interfaces

f. A channelized OC1 converted into a channelized T3, which is partitioned into T1 interfaces

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g. A channelized OC1 converted into a channelized T3, which is partitioned into T1 interfaces and a channelized T1, which is partitioned into *N*xDS0 interfaces

h. A channelized OC1 partitioned into channelized T1s, which are partitioned into *N*xDS0 interfaces

Configuring the Interface Partitions

```
[edit interfaces]
coc12-1/1/0 {
  sonet-options {
    sonet-options-statements;
  }
  partition 1 oc-slice 1-3 interface-type so; # (a) so-1/1/0:1
  partition 2 oc-slice 4-6 interface-type so; # (b) so-1/1/0:2
  partition 3 oc-slice 7 interface-type coc1; # (c) coc1-1/1/0:3
  partition 4 oc-slice 8 interface-type coc1; #(d) coc1-1/1/0:5
  partition 5 oc-slice 9 interface-type coc1; # (e) coc1/1/0:5
  partition 6 oc-slice 10 interface-type coc1; # (f) coc1-1/1/0:6
  partition 7 oc-slice 11 interface-type coc1; # (g) coc1-1/1/0:7
  partition 8 oc-slice 12 interface-type coc1; # (h) coc1-1/1/0:8
}
```

(a)

```
so-1/1/0:1 {
  description "(a) OC-slice 1-3 of coc12-1/1/0. COC12 > OC3.;
  sonet-options {
    sonet-options-statements;
  }
}
```

(b)

```
so-1/1/0:2 {
  description "(b) OC-slice 4-6 of coc12-1/1/0. COC12 > OC3.;
  sonet-options {
    sonet-options-statements;
  }
}
```

(c)

```
coc1-1/1/0:3 {
  description "(c) OC-slice 7 of coc12-1/1/0. COC12 to COC1 VT-mapped to T1s.";
  sonet-options {
    sonet-options-statements;
  }
  partition 1 - 10 interface-type t1; # t1-1/1/0:[1-10]
}
t1-1/1/0:3:1 {
  description "(c) OC-slice 7 of coc12-1/1/0. T1 interface configuration.";
  t1-options {
    t1-options-statements;
  }
}
...
```

(d)

```
coc1-1/1/0:4 {
  description "(d) OC-slice 8 of coc12-1/1/0. COC12 to COC1 converted to a T3.";
  sonet-options {
    sonet-options-statements;
  }
```

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```
    no-partition interface-type t3; # t3-1/1/0:4
  }
  t3-1/1/0:4 {
    description "(d) OC-slice 8 of coc12-1/1/0. T3 interface configuration.";
  }
```

(e)

```
  coc1-1/1/0:5 {
    description "(e) OC-slice 9 of coc12-1/1/0. COC12 to COC1 VT-mapped to T1s.";
    sonet-options {
      sonet-options-statements;
    }
    partition 1 - 3 interface-type t1; # t1-1/1/0:5:[1-3]
    partition 4 interface-type ct1; # ct1-1/1/0:5:4
  }
  t1-1/1/0:5:1 {
    description "(e) OC-slice 9 of coc12-1/1/0. T1 interface configuration.";
    t1-options {
      t1-options-statements;
    }
  }
  ...
  ct1-1/1/0:5:4 {
    description "(e) OC-slice 9 of coc12-1/1/0. CT1 to NxDSOs.;
    t1-options {
      t1-options-statements;
    }
    partition 1 timeslots 0 - 10 interface-type ds0; # ds-1/1/0:5:4:1
    partition 2 timeslots 11- 23 interface-type ds0; # ds-1/1/0:5:4:2
    ...
  }
```

(f)

```
  coc1-1/1/0:6 {
    description "(f) OC-slice 10 of coc12-1/1/0. COC12 to COC1 converted to a CT3 to T1s.";
    sonet-options {
      sonet-options-statements;
    }
    no-partition interface-type ct3; # ct3-1/1/0:6
  }
  ct3-1/1/0:6 {
    description "(f) COC12 to CT3 M-13 and C-bit parity-mapped to T1s.;
    sonet-options {
      sonet-options-statements;
    }
    partition 1 - 10 interface-type t1; # t1-1/1/0:6:[1-10]
  }
  t1-1/1/0:6:1 {
    description "(f) T1 interface configuration.";
    t1-options {
      t1-options-statements;
    }
  }
  ...
```

(g)

```
  coc1-1/1/0:7 {
```


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```
    description "(g) OC-slice 11 of coc12-1/1/0. COC12 to COC1 converted to a CT3 to T1s and
      CT1 to NxDS0s.";
    sonet-options {
      sonet-options-statements;
    }
    no-partition interface-type ct3; # ct3-1/1/0:7
  }
  ct3-1/1/0:7 {
    description "(g) COC12 to CT3 M-13 and C-bit parity-mapped to T1s and CT1.";
    sonet-options {
      sonet-options-statements;
    }
    partition 1 - 10 interface-type t1; # t1-1/1/0:7:[1-10]
    partition 2 interface-type ct1; # ct1-1/1/0:7:11
  }
  t1-1/1/0:7:1 {
    description "(g) T1 interface configuration.";
    t1-options {
      t1-options-statements;
    }
  }
  ...
  ct1-1/1/0:7:11 {
    description "(g) CT1 to NxDSOs.";
    t1-options {
      t1-options-statements;
    }
    partition 1 timeslots 0 - 10 interface-type ds0; # ds-1/1/0:7:11:1
    partition 2 timeslots 11- 23 interface-type ds0; # ds-1/1/0:7:11:2
    ...
  }
```

(h)

```
  coc1-1/1/0:8 {
    description "(h) OC-slice 12 of coc12-1/1/0. COC12 to COC1 VT-mapped to CT1 to NxDS0s.";
    sonet-options {
      sonet-options-statements;
    }
    partition 1 interface-type t1; # ct1-1/1/0:8:1
  }
  ct1-1/1/0:8:1 {
    description "(h) CT1 to NxDSOs.";
    t1-options {
      t1-options-statements;
    }
    partition 1 timeslots 0 - 10 interface-type ds0; # ds-1/1/0:8:1:1
    partition 2 timeslots 11- 23 interface-type ds0; # ds-1/1/0:8:1:2
    ...
  }
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Related Documentation

- Channelized Interfaces Overview on page 3

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Example: Configuring Channelized OC12 Interfaces with Partitioned Channels

The following configuration is sufficient to get the channelized OC12 interface up and running. The OC12 interface can be divided into 12 channels. DS3 channels can use the following encapsulation types:

- PPP, PPP CCC, and PPP TCC
- Frame Relay, Frame Relay CCC, and Frame Relay TCC
- Cisco HDLC, Cisco HDLC CCC, and Cisco HDLC TCC

The channels can also have logical interfaces.

```
[edit interfaces]
t3-fpc/pic/port:0 {
    encapsulation cisco-hdlc;
    t3-options {
        compatibility-mode larscom;
        payload-scrambler;
    }
    unit 0 {
        family inet {
            address 10.11.30.1/30;
        }
        family iso;
    }
}
t3-fpc/pic/port:1 {
    encapsulation ppp;
    t3-options {
        compatibility-mode larscom;
        payload-scrambler;
    }
    unit 0 {
        family inet {
            address 10.11.30.5/30;
        }
        family iso;
    }
}
t3-fpc/pic/port:2 {
    encapsulation frame-relay;
    t3-options {
        compatibility-mode larscom;
        payload-scrambler;
    }
    unit 0 {
        dlci 100;
        family inet {
            address 10.11.30.9/30;
        }
        family iso;
    }
    unit 1 {
```


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```
        dlci 101;
        family inet {
          address 10.11.31.9/30;
        }
        family iso;
      }
    }
    t3-1fpc/pic/port:3 {
      encapsulation cisco-hdlc-ccc;
      t3-options {
        compatibility-mode larscom;
        payload-scrambler;
      }
      unit 0;
    }
    t3-fpc/pic/port:4 {
      encapsulation ppp-ccc;
      t3-options {
        compatibility-mode larscom;
        payload-scrambler;
      }
      unit 0;
    }
    t3-fpc/pic/port:5 {
      dce;
      encapsulation frame-relay-ccc;
      t3-options {
        compatibility-mode larscom;
        payload-scrambler;
      }
      unit 0 {
        encapsulation frame-relay-ccc;
        dlci 1000;
      }
      unit 1 {
        encapsulation frame-relay-ccc;
        dlci 1001;
      }
    }
```

Related Documentation

- Configuring Channelized OC12 Interfaces on page 134

Configuring Link PIC Failover on Channelized OC12/STM4 IQ and IQE Interfaces

For Channelized OC12 IQ or IQE PICs used as linking PICs in redundant LSQ configurations, you can inhibit the router from sending PPP termination-request messages to the remote host if the link PIC fails. To do this, include the no-termination-request statement at the **[edit interfaces *interface-name* ppp-options]** hierarchy level:

```
no-termination-request;
```

The **no-termination-request** statement is supported only with MLPPP and SONET APS configurations and works with PPP, PPP over Frame Relay, and MLPPP interfaces only.

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For information about interchassis and intrachassis LSQ failover, see the *Junos OS Services Interfaces Library for Routing Devices*.

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CHAPTER 7

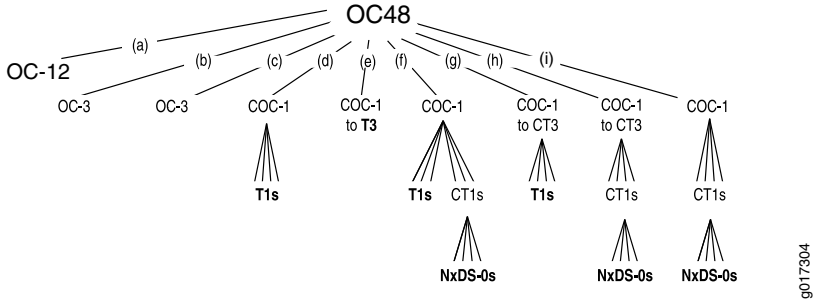
Configuring Channelized OC48/STM16 IQE Interfaces

- Channelized OC48/STM16 IQE Interfaces Overview on page 165
- Configuring Channelized OC48/STM16 IQE Interfaces (SONET Mode) on page 167
- Configuring Channelized OC48/STM16 IQE Interfaces (SDH Mode) on page 174
- Example: Configuring Channelized OC48 Interfaces with Partitioned Channels on page 180
- Configuring Link PIC Failover on Channelized OC48/STM16 IQE Interfaces on page 182

Channelized OC48/STM16 IQE Interfaces Overview

Channelized enhanced intelligent queuing (IQE) interfaces allow arbitrary and dynamic channelization of serial links, allowing greater flexibility than the channelized interfaces. Figure 33 on page 165, Figure 34 on page 166, and Figure 35 on page 167 illustrate the Channelized OC48/STM16 IQE Physical Interface Cards (PICs) in several examples of many possible configurations.

Figure 33: Sample Channelization of OC48/STM16 IQE PIC (SONET Mode)



Bold entries correspond to actual packet channels.

In the example in Figure 33 on page 165, a Channelized OC48/STM16 IQE PIC operating in SONET mode is partitioned into the following OC slices:

a. A clear channel OC12 interface.

b. An OC3 interface.

c. A channelized COC1 partitioned into T1 interfaces.

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d. A channelized COC1 partitioned into a T3 interface.

e. A channelized COC1 partitioned into CT3, partitioned into T1 interfaces, and CT1s partitioned into *N*xDS0 interfaces.

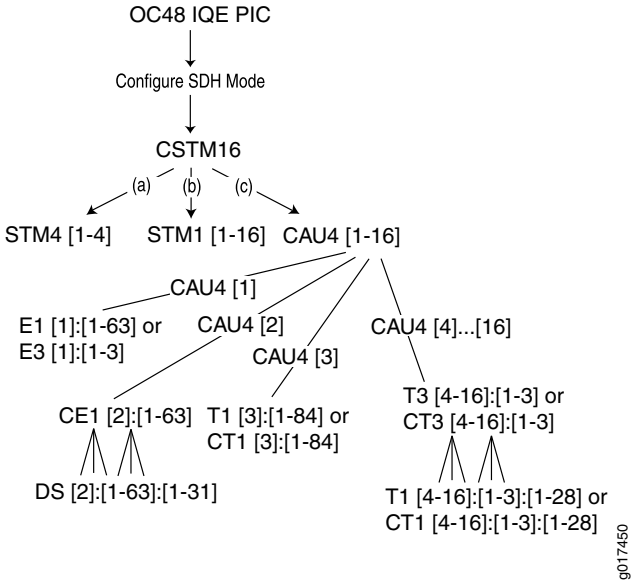
f. A channelized COC1 partitioned into CT3, partitioned into T1 interfaces.

g. A channelized COC1 partitioned into CT3, partitioned into CT1s, partitioned into *N*xDS0 interfaces.

h. A channelized COC1 partitioned into CT1s, partitioned into *N*xDS0 interfaces.

This is one of thousands of ways to configure a Channelized OC48/STM16 IQE PIC. To configure the interfaces shown in Figure 34 on page 166, see "Configuring Channelized OC48/STM16 IQE Interfaces (SDH Mode)" on page 174.

Figure 34: Sample Channelization of OC48/STM16 IQE PIC (SDH Mode)



In Figure 34 on page 166, a Channelized OC48/STM16 IQE PIC operating in SDH mode results in a channelized STM16 interface, which can partitioned as the following:

a. Up to 4 STM4s.

b. Up to 16 STM1s.

c. Up to 16 CAU4s that can each be partitioned into up to 63 E1s, up to 3 E3s, or up to 63 CE1s. Up to 16 CAU4s that can each be partitioned into up to 84 T1s, 84 CT1s, 63 E1s, 63 CE1s, 3 E3s, 3 T3s or 3 CT3s. Each CE1 can be partitioned into up to 31 NxDS0s. Each CT1 can be partitioned into up to 24 NxDS0s. Each CT3 can be partitioned into up to 28 T1s or 28 CT1s.

This is one of thousands of ways to configure a Channelized OC48/STM16 IQE PIC.

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Figure 35: Sample Channelization of OC48/STM16 IQE PIC to E3 Channels

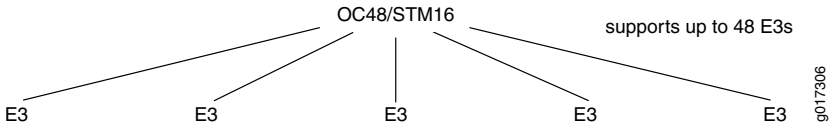

Figure 35 on page 167 shows five E3 channels configured on the Channelized OC48/STM16 IQE PIC. You can configure 43 additional E3 channels. For more information about configuring E3 channels on Channelized OC48/STM16 IQE PICs, see "Configuring E3 Interfaces" on page 176.

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring Channelized OC48/STM16 IQE Interfaces (SONET Mode)

- Configuring OC12 Interfaces on page 167
- Configuring OC3 Interfaces on page 168
- Configuring T3 Interfaces on page 169
- Configuring T1 Interfaces on page 170
- Configuring Fractional T1 Interfaces on page 172
- Configuring NxDS0 Interfaces on page 172

Configuring OC12 Interfaces

You can configure up to four OC12 interfaces on a 1-port Channelized OC48/STM16 IQE PIC. To configure an OC12 interface, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc48-*fpc/pic/port*]** hierarchy level, specifying the **so** interface type:

```
[edit interfaces coc48-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type so;
```

The partition number is the sublevel interface partition index. For SONET/SDH interfaces, the partition number does not correlate with bandwidth size. For OC12 interfaces, the partition number can be from 1 through 4.

NOTE: **For channelized OC48 IQE interfaces, channel numbering begins with 1 (:1).**

The OC-slice range is the range of SONET/SDH slices. For SONET/SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. OC12 interfaces must occupy 12 consecutive OC slices per interface, in one of the following forms:

- 1–12
- 13–24

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- 25–26
- 37–48

By contrast, the T3 and OC1 interfaces each occupy one OC slice per interface and OC3 interfaces occupy three slices per interface.

The interface type is the channelized interface type or data channel you are creating. For channelized OC48 IQE interfaces, the interface type can be **so**.

Example: Configuring OC12 Interfaces

Configure an OC12 interface, using partition 1 and OC slices 1 through 12. This configuration creates interface **so-1/1/0:1**.

```
[edit interfaces coc48-1/1/0]
partition 1 oc-slice 1-12 interface-type so;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring OC3 Interfaces

To configure an OC3 interface, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc48-*fpc/pic/port*]** hierarchy level, specifying the **so** interface type:

```
[edit interfaces coc48-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type so;
```

The partition number is the sublevel interface partition index. For SONET/SDH interfaces, the partition number does not correlate with bandwidth size. For OC3 interfaces, the partition number can be from 1 through 16.

NOTE: For channelized OC48 IQE interfaces, channel numbering begins with 1 (:1).

The OC-slice range is the range of SONET/SDH slices. For SONET/SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. OC3 interfaces must occupy three consecutive OC slices per interface, in one of the following forms:

- 1–3
- 4–6
- 7–9
- 10–12
- and so on (in groups of 3), up to 48

By contrast, the T3 and OC1 interfaces each occupy one OC slice per interface.

The interface type is the channelized interface type or data channel you are creating. For channelized OC48 IQE interfaces, the interface type can be **so**.

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Example: Configuring OC3 Interfaces

Configure an OC3 interface, using partition 1 and OC slices 4 through 6. This configuration creates interface **so-1/1/0:1**.

```
[edit interfaces coc48-1/1/0]
partition 1 oc-slice 4-6 interface-type so;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring T3 Interfaces

To configure a T3 interface on an OC48/STM16 IQE PIC, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc48-*fpc/pic/port*]** hierarchy level, specifying the **coc1** interface type:

```
[edit interfaces coc48-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type coc1;
```

This configuration creates interface **coc1-*fpc/pic/port*:*channel***.

Then, include the **no-partition interface-type** statement at the **[edit interfaces coc1-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **t3** interface type:

```
[edit interfaces coc1-fpc/pic/port:channel]
no-partition interface-type t3;
```

This configuration creates interface **t3-*fpc/pic/port*:*channel***.

The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized OC1 interfaces, the partition number can be from 1 through 48. For channelized OC48/STM16 IQE interfaces, channel numbering begins with 1 (:1).

The OC-slice range is the range of SONET/SDH slices. For SONET/SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. For channelized OC1 interfaces, the OC slice can be from 1 through 12. You can configure only one OC slice per channelized OC1 interface.

The interface type is the channelized interface type or clear channel you are creating. For channelized OC48 interfaces, ***type*** can be **so** or **coc1**.

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NOTE: Channelized OC48/STM16 IQE interfaces in M Series, MX Series, and T Series routers reserve channels 0 through 3 of each OC12 space for STS3C SONET channels.

When you configure E3 or T3 channels in OC12 spaces on the described PICs, the Junos OS allocates them starting from channel 4 because channels 0 through 3 are reserved for four STS3c SONET channels. Channel numbers are allocated sequentially in the following order: 4, 5, 6, 7, 8, 9, 11, 0, 1, 2, 3.

Only after channels 4 through 11 of the OC12 space are exhausted (all 4 through 11 configured) for E3 or T3 channels will the Junos OS then allocate channel 0 through 3 space for further E3 or T3 channels; thereby using up the 0 through 3 space previously reserved for four STS3c SONET channels.

If a subsequent reconfiguration of this OC12 space occurs, where you try to replace channels 4 through 6 or 7 through 9 with an OC3 SONET channel; the configuration fails because the channel 0 through 3 space is already occupied by the last E3 or T3 channels configured. This causes a failure in channel allocation and the Device Control Daemon (DCD) keeps retrying forever to configure the channel allocation on the interface. The only resolution is to reconfigure the last configured E3/T3 channels with OC3 channels, to free channels 0 through 3.

Example: Configuring T3 Interfaces

Configure a T3 interface using partition 3 and OC slice 3. This configuration creates interface **t3-1/1/0:3**:

```
[edit interfaces coc48-1/1/0]
partition 3 oc-slice 3 interface-type coc1;
[edit interfaces coc1-1/1/0:3]
no-partition interface-type t3;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring T1 Interfaces

To configure T1 interfaces on a Channelized OC48 IQE PIC, perform the following tasks:

1. Partition the channelized OC48 IQE interface into channelized OC1 interfaces by including the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc48-*fpc/pic/port*]** hierarchy level, specifying the **coc1** interface type:

   ```
   [edit interfaces coc48-fpc/pic/port]
   partition partition-number oc-slice oc-slice-range interface-type coc1;
   ```

2. If your network equipment uses VT mapping, partition the channelized OC1 interface into T1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces coc1-*fpc/pic/port*]** hierarchy level, specifying the **t1** interface type:

   ```
   [edit interfaces coc1-fpc/pic/port:channel]
   partition partition-number interface-type t1;
   ```


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3. If your network equipment uses M13 or C-bit parity, convert the channelized OC1 interface into a channelized T3 interface by including the **no-partition** and **interface-type** statements at the **[edit interfaces coc1-*fpc/pic/port:channel*]** hierarchy level, specifying the **ct3** interface type. Note that because the **no-partition** statement is included, this configuration does not create another level of channelization, as denoted by the number of colons in the resulting interface.

   ```
   [edit interfaces coc1-fpc/pic/port:channel]
   no-partition partition-number interface-type ct3;
   ```

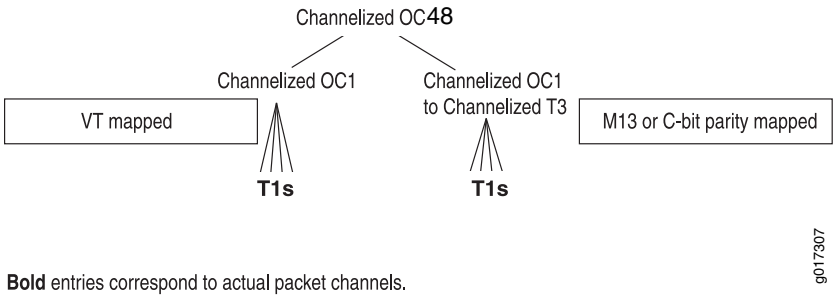
4. Partition the channelized T3 interface into T1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces ct3-*fpc/pic/port:channel*]** hierarchy level, specifying the **t1** interface type:

   ```
   [edit interfaces ct3-fpc/pic/port:channel]
   partition partition-number interface-type t1;
   ```

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQE interfaces. You can only apply CoS rules to the aggregate bit streams.

Figure 36 on page 171 shows VT-mapped and M13 or C-bit parity-mapped configurations of T1 interfaces.

Figure 36: T1 Interfaces on a Channelized OC48 PIC



Bold entries correspond to actual packet channels.

Example: Configuring T1 Interfaces

Configure the following T1 interfaces:

```
t1-0/0/0:1:1
t1-0/0/0:1:2
t1-0/0/0:1:3
t1-0/0/0:1:4
t1-0/0/0:1:5
```

VT-Mapped Configuration

```
[edit interfaces coc48-0/0/0]
partition 1 oc-slice 1 interface-type coc1;

[edit interfaces coc1-0/0/0:1]
partition 1-5 interface-type t1;
```

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M13 or C-bit Parity-Mapped Configuration

```
[edit interfaces coc48-0/0/0]
partition 1 oc-slice 1 interface-type coc1;

[edit interfaces coc1-0/0/0:1]
no-partition interface-type ct3;

[edit interfaces ct3-0/0/0:1]
partition 1-5 interface-type t1;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring Fractional T1 Interfaces

By default, all the time slots on a channelized T1 interface are used. To configure a fractional T1 interface on a Channelized OC48 IQE PIC, perform the following tasks:

1. Configure a T1 interface. For more information, see "Configuring T1 Interfaces" on page 170.
2. Configure the number of time slots allocated to the T1 interface by including the **timeslots** statement at the **[edit interfaces t1-*fpc/pic/port*<:*channel*> t1-options]** hierarchy level:

   ```
   [edit interfaces t1-fpc/pic/port<:channel> t1-options]
   timeslots time-slot-range;
   ```

For channelized T1 interfaces, the time-slot range is from 1 through 24. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces. For more information, see *Configuring Fractional T1 Time Slots*.

Example: Configuring Fractional T1 Interfaces

Configure a fractional T1 interface that uses time slots 1 through 5 and 10:

```
[edit interfaces coc48-0/0/0]
partition 1 oc-slice 1 interface-type coc1;
[edit interfaces coc1-0/0/0:1]
partition 1 interface-type t1;
[edit interfaces t1-0/0/0:1:1 t1-options]
timeslots 1-5,10;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring NxDS0 Interfaces

To configure *N*xDS0 interfaces on a Channelized OC48 IQE PIC, perform the following tasks:

1. Partition the channelized OC48 IQE interface into channelized OC1 interfaces by including the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces coc48-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **coc1** interface type:

   ```
   [edit interfaces coc48-fpc/pic/port:channel]
   partition partition-number oc-slice oc-slice-range interface-type coc1;
   ```


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2. If your network equipment uses VT mapping, partition the channelized OC1 interface into channelized T1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces coc1-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **ct1** interface type:

   ```
   [edit interfaces coc1-fpc/pic/port:channel]
   partition partition-number interface-type ct1;
   ```

   NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQE interfaces. You can only apply CoS rules to the aggregate bit streams.

   If your network equipment uses M13 or C-bit parity, convert the channelized OC1 interface into a channelized T3 interface by including the **no-partition** and **interface-type** statements at the **[edit interfaces coc1-*fpc/pic/port*]** hierarchy level, specifying the **ct3** interface type:

   ```
   [edit interfaces coc1-fpc/pic/port:channel]
   no-partition partition-number interface-type ct3;
   ```

   NOTE: Because the **no-partition** statement is included, this configuration task does not create another level of channelization, as denoted by the number of colons in the resulting interface.

3. Partition the channelized T3 interface into channelized T1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces ct3-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **ct1** interface type:

   ```
   [edit interfaces ct3-fpc/pic/port:channel]
   partition partition-number interface-type ct1;
   ```

4. Configure channelized *N*xDS0 interfaces on the channelized T1 interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces ct1-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **ds** interface type:

   ```
   [edit interfaces ct1-fpc/pic/port:channel:channel]
   partition partition-number timeslots time-slot-range interface-type ds;
   ```

Figure 37 on page 174 shows VT-mapped and M13 or C-bit parity-mapped configurations of *N*xDS0 interfaces.

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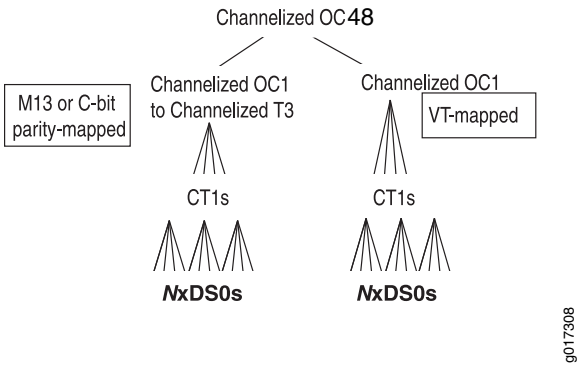
Figure 37: Sample Channelization of OC48 IQE PIC



Bold entries correspond to actual packet channels.

Example: Configuring NxDS0 Interfaces

Configure the following two *N*xDS0 interfaces with 10 time slots and 4 time slots, respectively:

ds-0/0/0:1:2:1
ds-0/0/0:1:2:2

VT-Mapped Configuration

```
[edit interfaces coc48-0/0/0]
partition 1 oc-slice 1 interface-type coc1;

[edit interfaces coc1-0/0/0:1]
partition 2 interface-type ct1;

[edit interfaces ct1-0/0/0:1:2]
partition 1 timeslots 1-10 interface-type ds;
partition 2 timeslots 12-15 interface-type ds;
```

M13 or C-bit Parity-Mapped Configuration

```
[edit interfaces coc48-0/0/0]
partition 1 oc-slice 1 interface-type coc1;

[edit interfaces coc1-0/0/0:1]
no-partition interface-type ct3;

[edit interfaces ct3-0/0/0:1]
partition 2 interface-type ct1;

[edit interfaces ct1-0/0/0:1:2]
partition 1 timeslots 1-10 interface-type ds;
partition 2 timeslots 12-15 interface-type ds;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring Channelized OC48/STM16 IQE Interfaces (SDH Mode)

The Channelized OC48 IQE PIC configured for SDH mode creates a single channelized STM16 interface. You can configure the STM16 interface using the **partition** statement

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at the **[edit interfaces cstm16-*fpc/pic/port*]** hierarchy level to partition it into the following OC slices:

- 16 channelized AU-4 interfaces or a path layer with 4 STM4 or 16 STM1 interfaces.
- 16 channelized AU-4 interfaces, each partitioned to 3 clear channel E3 interfaces or 63 CE1 or E1 (ITU-T or KLM) interfaces. Combination of E1, CE1 and E3 are not supported in a single cau4.
- 16 channelized AU-4 interfaces, each partitioned to 63 CE1 (ITU-T or KLM) interfaces each partitioned to 31 *N*xDS0 interfaces

This section describes how to configure the following channelized OC48 IQE interfaces on a Channelized OC48 IQE PIC configured in SDH mode:

- Configuring a Channelized OC48/STM16 IQE PIC for SDH Mode on page 175
- Configuring Clear Channel STM1 and STM4 Interfaces on page 175
- Configuring Channelized AU-4 Interfaces on page 176
- Configuring E3 Interfaces on page 176
- Configuring E1 or Channelized E1 Interfaces on page 177
- Configuring NxDS0 IQE Interfaces on page 178
- Configuring T3 or Channelized T3 Interfaces on page 178
- Configuring T1 or Channelized T1 Interfaces on page 179

Configuring a Channelized OC48/STM16 IQE PIC for SDH Mode

To configure a Channelized OC48/STM16 IQE PIC to operate in SDH mode, include the **framing sdh** statement at the **[edit chassis fpc *fpc/pic/port*]** hierarchy level:

```
[edit chassis ]
  fpc 0 {
    pic 2 {
      framing sdh;
    }
  }
}
```

This configuration creates interface **cstm16-0/2/0**.

For more information, see the *Junos OS Administration Library for Routing Devices*.

Configuring Clear Channel STM1 and STM4 Interfaces

On a Channelized OC48/STM16 IQE PIC, you can partition the CSTM16 transport layer into 4 clear channel STM4 interfaces or 16 clear channel STM1 interfaces. Combinations of STM4 and STM1 are also permitted, but you must observe the OC-slice parameters.

To configure an STM4 interface, include the **partition** and **interface-type** statements at the **[edit interfaces cstm16-*fpc/pic/port*]** hierarchy level:

```
[edit interfaces cstm16-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type so;
```

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This configuration creates interface **so-*fpc/pic/port.channel***.

To configure an STM1 interface, include the **partition** and **interface-type** statements at the **[edit interfaces cstm16-*fpc/pic/port*]** hierarchy level:

```
[edit interfaces cstm16-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type so;
```

This configuration creates interface **so-*fpc/pic/port.channel***.

Configuring Channelized AU-4 Interfaces

To configure a channelized AU-4 interface, include the **partition**, **oc-slice**, and **interface-type** statements at the **[edit interfaces cstm16-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **cau4** interface type:

```
[edit interfaces cstm16-fpc/pic/port]
partition partition-number oc-slice oc-slice-range interface-type cau4;
```

This configuration creates interface **cau4-*fpc/pic/port*:*channel***.

The partition number is the sublevel interface partition index. For SDH interfaces, the partition number is not correlated with bandwidth size. For channelized OC48/STM16 IQE interfaces, channelized STM16 interface can have from 1 through 16 partition numbers and channel numbering begins with 1 (:1).

The OC-slice range is the range of SONET/SDH slices. For SDH interfaces, the OC-slice range specifies the bandwidth size required for the interface type you are configuring. The interface type is the channelized interface type or data channel you are creating.

Example: Configuring Channelized AU-4 Interfaces

Configure channelized AU-4 interfaces:

```
[edit interfaces cstm16-0/2/0]
partition 1 oc-slice 1-3 interface-type cau4;
```

Configuring E3 Interfaces

To configure E3 interfaces, include the **partition** and **interface-type** statements at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level, specifying the **e3** interface type:

```
[edit interfaces]
cau4-fpc/pic/port {
  partition partition-number interface-type e3;
}
```

This configuration creates the interfaces **e3-*fpc/pic/port*:*channel***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQE interfaces. You can only apply CoS rules to the aggregate bit streams.

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NOTE: Channelized OC48/STM16 IQE interfaces in M Series, MX Series, and T Series routers reserve channels 0-3 of each OC12 space for STS3C SONET channels.

When you configure E3 or T3 channels in OC12 spaces on the described PICs, Junos OS allocates them starting from channel 4 because channels 0-3 are reserved for four STS3c SONET channels. Channel numbers are allocated sequentially in the following order: 4, 5, 6, 7, 8, 9, 11, 0, 1, 2, 3.

Only after channels 4 through 11 of the OC12 space are exhausted (all 4 through 11 configured) for E3 or T3 channels will Junos OS then allocate channel 0-3 space for further E3 or T3 channels; thereby using up the 0-3 space previously reserved for four STS3c SONET channels.

If a subsequent reconfiguration of this OC12 space occurs, where you try to replace channels 4-6 or 7-9 with an OC3 SONET channel; it fails because the channel 0-3 space is already occupied by the last E3 or T3 channels configured. This causes a failure in channel allocation and the Device Control Daemon (DCD) keeps retrying forever to configure the channel allocation on the interface. The only resolution is to reconfigure the last configured E3/T3 channels with OC3 channels, to free channels 0-3.

Example: Configuring E3 Interfaces

Configure E3 interfaces, using partition 1:

```
[edit interfaces]
cau4-0/2/0:1 {
   partition 1 interface-type e3;
}
e3-0/2/0:1:1;
```

Configuring E1 or Channelized E1 Interfaces

To configure E1 or channelized E1 interfaces, include the **partition** and **interface-type** statements at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level, specifying the **e1** or **ce1** interface type:

```
[edit interfaces]
cau4-fpc/pic/port {
   partition partition-number interface-type e1;
}
cau4-fpc/pic/port {
   partition partition-number interface-type ce1;
}
```

This configuration creates the interfaces **e1-*fpc/pic/port*:*channel*** and **ce1-*fpc/pic/port*:*channel***.

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NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQE interfaces. You can only apply CoS rules to the aggregate bit streams.

Example: Configuring E1 and Channelized E1 Interfaces

Configure E1 or channelized E1 interfaces, using partition 3 and partition 4:

```
[edit interfaces]
cau4-0/2/0:1 {
   partition 3 interface-type e1;
}
cau4-0/2/0:1 {
   partition 4 interface-type ce1;
}
```

This configuration creates interfaces **e1-0/2/0:1:3** and **ce1-0/2/0:1:4**.

Configuring NxDS0 IQE Interfaces

Configure channelized *N*xDS0 IQE interfaces on the channelized E1 IQE interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces ce1-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **ds** interface type:

```
[edit interfaces ce1-fpc/pic/port:channel:channel]
partition partition-number timeslots time-slot-range interface-type ds;
```

This configuration creates the interface **ds-*fpc/pic/port*:*channel***.

The time-slot range is from 1 through 31. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. You can use a combination of ranges and discontinuous time slots, for example:

```
1,9-18,21
```

Example: Configuring NxDS0 IQE Interfaces

Configure channelized *N*xDS0 interfaces, using partition 4 and time slots 1 through 10:

```
[edit interfaces]
ce1-0/2/0:1:2:3 {
   partition 4 interface-type ds0 timeslots 1-10;
}
```

This configuration creates interface **ds0-0/2/0:1:2:3:4**.

Configuring T3 or Channelized T3 Interfaces

To configure T3 or channelized T3 interfaces, include the **partition** and **interface-type** statements at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level, specifying the **t3** or **ct3** interface type:

```
[edit interfaces]
cau4-fpc/pic/port {
   partition partition-number interface-type t3;
```


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```
}
cau4-fpc/pic/port {
  partition partition-number interface-type ct3;
}
```

This configuration creates the interfaces **t3-*fpc/pic/port*:*channel*** and **t3-*fpc/pic/port*:*channel***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can only apply CoS rules to the aggregate bit streams.

Example: Configuring T3 or Channelized T3 Interfaces

Configure T3 and channelized T3 interfaces, using partition 1 and partition 2:

```
[edit interfaces]
cau4-0/2/0:1 {
  partition 1 interface-type t3;
}
cau4-0/2/0:1 {
  partition 2 interface-type ct3;
}
t3-0/2/0:1:1 ct3-0/2/0:1:2;
```

Configuring T1 or Channelized T1 Interfaces

To configure T1 or channelized T1 interfaces, include the **partition** and **interface-type** statements at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level, specifying the **t1** or **ct1** interface type:

```
[edit interfaces]
cau4-fpc/pic/port {
  partition partition-number interface-type t1;
}
cau4-fpc/pic/port {
  partition partition-number interface-type ct1;
}
```

This configuration creates the interfaces **t1-*fpc/pic/port*:*channel*** and **t1-*fpc/pic/port*:*channel***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can only apply CoS rules to the aggregate bit streams.

Example: Configuring T1 or Channelized T1 Interfaces

Configure T1 and channelized T1 interfaces, using partition 1 and partition 2:

```
[edit interfaces]
cau4-0/2/0:1 {
```

```
    partition 1 interface-type t1;
}
cau4-0/2/0:1 {
    partition 2 interface-type ct1;
}
t1-0/2/0:1:1 ct1-0/2/0:1:2;
```

Example: Configuring Channelized OC48 Interfaces with Partitioned Channels

The following configuration is sufficient to get the channelized OC48 interface up and running. The OC48 interface can be divided into up to 4 OC12 channels, up to 16 OC3 channels, or up to 48 OC1 channels and combinations are permitted; for example, 1 OC12, 4 OC3s, and 24 OC1s. There are 48 OC1 slices available on the OC48 IQE interface. An OC48 configuration uses all 48 slices, each OC12 uses 12 slices, each OC1 uses 1 slice. Permissible combinations must fit within the 48 available OC1 slices. DS1 channels can use the following encapsulation types:

- PPP, PPP CCC, and PPP TCC
- Frame Relay, Frame Relay CCC, and Frame Relay TCC
- Cisco HDLC, Cisco HDLC CCC, and Cisco HDLC TCC

The channels can also have logical interfaces.

```
[edit interfaces]
t3-fpc/pic/port:0 {
    encapsulation cisco-hdlc;
    t3-options {
        compatibility-mode larscom;
        payload-scrambler;
    }
    unit 0 {
        family inet {
            address 10.11.30.1/30;
        }
        family iso;
    }
}
t3-fpc/pic/port:1 {
    encapsulation ppp;
    t3-options {
        compatibility-mode larscom;
        payload-scrambler;
    }
    unit 0 {
        family inet {
            address 10.11.30.5/30;
        }
        family iso;
    }
}
t3-fpc/pic/port:2 {
    encapsulation frame-relay;
    t3-options {
```


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```
        compatibility-mode larscom;
        payload-scrambler;
      }
      unit 0 {
        dlci 100;
        family inet {
          address 10.11.30.9/30;
        }
        family iso;
      }
      unit 1 {
        dlci 101;
        family inet {
          address 10.11.31.9/30;
        }
        family iso;
      }
    }
    t3-1fpc/pic/port:3 {
      encapsulation cisco-hdlc-ccc;
      t3-options {
        compatibility-mode larscom;
        payload-scrambler;
      }
      unit 0;
    }
    t3-fpc/pic/port:4 {
      encapsulation ppp-ccc;
      t3-options {
        compatibility-mode larscom;
        payload-scrambler;
      }
      unit 0;
    }
    t3-fpc/pic/port:5 {
      dce;
      encapsulation frame-relay-ccc;
      t3-options {
        compatibility-mode larscom;
        payload-scrambler;
      }
      unit 0 {
        encapsulation frame-relay-ccc;
        dlci 1000;
      }
      unit 1 {
        encapsulation frame-relay-ccc;
        dlci 1001;
      }
    }
```

Related Documentation

- Channelized Interfaces Overview on page 3

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Configuring Link PIC Failover on Channelized OC48/STM16 IQE Interfaces

For Channelized OC48 IQE PICs used as linking PICs in redundant LSQ configurations, you can inhibit the router from sending PPP termination-request messages to the remote host if the link PIC fails. To do this, include the no-termination-request statement at the **[edit interfaces *interface-name* ppp-options]** hierarchy level:

```
no-termination-request;
```

The **no-termination-request** statement is supported only with MLPPP and SONET APS configurations and works with PPP, PPP over Frame Relay, and MLPPP interfaces only.

For information about interchassis and intrachassis LSQ failover, see the *Junos OS Services Interfaces Library for Routing Devices*.

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CHAPTER 8

Configuring Channelized STM1 Interfaces

- Channelized STM1 Interfaces Overview on page 183
- Configuring Channelized STM1 Interfaces on page 183
- Example: Configuring Channelized STM1 Interfaces on page 192
- Configuring Channelized STM1 IQ and IQE Interfaces on page 193
- Configuring Link PIC Failover on Channelized STM1 Interfaces on page 199

Channelized STM1 Interfaces Overview

Each Channelized STM1 PIC and Channelized STM1 Intelligent Queuing (IQ) PIC has one STM1 port.

For the Channelized STM1 IQ or IQE PIC, you can channelize the single port to the *N*xDS0 level. Each E1 interface has 32 time slots (DS0), in which time slot 0 is reserved.

You can combine one or more of these DS0 time slots (channels) to create a channel group (*N*xDS0).

Related Documentation

- Configuring Channelized STM1 Interfaces on page 183

Configuring Channelized STM1 Interfaces

To specify the channel number, include it after the colon (:) in the interface name. For example, a Channelized STM1-to-E1 PIC in FPC 1 and slot 1 will have the following physical interface, depending on the media type:

e1-1/1/0:*x*

The E1 channel number can be from 0 through 62.

This section contains the following topics:

- Configuring Channelized STM1 Interface Properties on page 184
- Configuring Virtual Tributary Mapping of Channelized STM1 Interfaces on page 185

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Configuring Channelized STM1 Interface Properties

To configure the interface properties for Channelized STM1-to-E1 PICs, include the **e1-options** and **sonet-options** statements for both sides of the connection. The following configurations list all the valid statements.

To specify options for each of the E1 channels on the Channelized STM1-to-E1 PIC, include the **e1-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
e1-options {
  bert-error-rate;
  bert-period;
  fcs (16 | 32);
  framing (g704 | g704-no-crc4 | unframed);
  idle-cycle-flag (flags | ones);
  loopback (local | remote);
  start-end-flag (filler | shared);
  timeslots time-slot-number;
}
```

NOTE: When a channelized STM1 interface experiences a line transition, the E1 channels configured in unframed mode log a large number of drops (around 24,000) as the channelized STM1 interface clocks resynchronize. This does not occur on framed channels, because the framing resynchronizes clocks very quickly.

To specify options for the SONET/SDH side of the connection, include the **sonet-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
sonet-options {
  aps {
    advertise-interval milliseconds;
    authentication-key key;
    force;
    hold-time milliseconds;
    lockout;
    neighbor address;
    paired-group group-name;
    protect-circuit group-name;
    request;
    revert-time seconds;
    switching-mode (bidirectional | unidirectional);
    working-circuit group-name;
  }
  bytes {
    e1-quiet value;
    f1 value;
    f2 value;
    s1 value;
    z3 value;
```


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```
        z4 value;
    }
    loopback (local | remote);
}
```

NOTE: On channelized STM1 interfaces, you should configure the clock source on one side of the connection to be internal (the default Junos configuration) and on the other side of the connection to be external.

For information about Frame Relay DLCI limitations for channelized interfaces, see "Data-Link Connection Identifiers on Channelized Interfaces" on page 6. For more information about Frame Relay DLCIs, see *Configuring Frame Relay DLCIs*. For information about DLCI sparse mode, see the *Junos OS Administration Library for Routing Devices*.

For more information about specific statements, see *E1 Interfaces Overview*, *SONET/SDH Interfaces Overview*, and *T1 Interfaces Overview*. For a configuration example, see "Example: Configuring Channelized STM1 Interfaces" on page 192.

Configuring Virtual Tributary Mapping of Channelized STM1 Interfaces

You can configure virtual tributary mapping to use KLM mode or ITU-T mode. To configure virtual tributary mapping, include the **vtmapping** statement at the **[edit chassis fpc *slot-number* pic *pic-number*]** hierarchy level:

```
[edit chassis fpc slot-number pic pic-number]
vtmapping (klm | itu-t);
```

By default, virtual tributary mapping uses KLM mode. For more information, see the *Junos OS Administration Library for Routing Devices*.

For the Channelized STM1 IQ and IQE PICs, you can configure virtual tributary mapping by including the **vtmapping** statement at the **[edit interfaces cau4-*fpc/pic/port* sonet-options]** hierarchy level:

```
[edit interfaces cau4-fpc/pic/port sonet-options]
vtmapping (klm | itu-t);
```

Table 18 on page 185 lists the KLM mappings used by the channelized STM1-to-E1 PIC interfaces. The PIC defaults to KLM numbering with an offset of –1; for example, KLM 1= STM1 PIC 0.

Table 18: Channelized STM1-to-E1 Channel Mapping

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
0	1	1	1	1	1
1	2	1	1	2	22
2	3	1	1	3	43
3	4	1	2	1	4

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Table 18: Channelized STM1-to-E1 Channel Mapping *(continued)*

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
4	5	1	2	2	25
5	6	1	2	3	46
6	7	1	3	1	7
7	8	1	3	2	28
8	9	1	3	3	49
9	10	1	4	1	10
10	11	1	4	2	31
11	12	1	4	3	52
12	13	1	5	1	13
13	14	1	5	2	34
14	15	1	5	3	55
15	16	1	6	1	16
16	17	1	6	2	37
17	18	1	6	3	58
18	19	1	7	1	19
19	20	1	7	2	40
20	21	1	7	3	61
21	22	2	1	1	2
22	23	2	1	2	23
23	24	2	1	3	44
24	25	2	2	1	5
25	26	2	2	2	26
26	27	2	2	3	47

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Table 18: Channelized STM1-to-E1 Channel Mapping *(continued)*

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
27	28	2	3	1	8
28	29	2	3	2	29
29	30	2	3	3	50
30	31	2	4	1	11
31	32	2	4	2	32
32	33	2	4	3	53
33	34	2	5	1	14
34	35	2	5	2	35
35	36	2	5	3	56
36	37	2	6	1	17
37	38	2	6	2	38
38	39	2	6	3	59
39	40	2	7	1	20
40	41	2	7	2	41
41	42	2	7	3	62
42	43	3	1	1	3
43	44	3	1	2	24
44	45	3	1	3	45
45	46	3	2	1	6
46	47	3	2	2	27
47	48	3	2	3	48
48	49	3	3	1	9
49	50	3	3	2	30

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Table 18: Channelized STM1-to-E1 Channel Mapping *(continued)*

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
50	51	3	3	3	51
51	52	3	4	1	12
52	53	3	4	2	33
53	54	3	4	3	54
54	55	3	5	1	15
55	56	3	5	2	36
56	57	3	5	3	57
57	58	3	6	1	18
58	59	3	6	2	39
59	60	3	6	3	60
60	61	3	7	1	21
61	62	3	7	2	42
62	63	3	7	3	63

Table 19 on page 188 lists the KLM mappings used by the channelized STM1-to-T1 PIC interfaces. The PIC defaults to KLM numbering with an offset of –1; for example, KLM 1= STM1 PIC 0.

Table 19: Channelized STM1-to-T1 Channel Mapping

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
0	1	1	1	1	1
1	2	1	1	2	22
2	3	1	1	3	43
3	4	1	2	1	4
4	5	1	2	2	25
5	6	1	2	3	46

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Table 19: Channelized STM1-to-T1 Channel Mapping *(continued)*

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
6	7	1	3	1	7
7	8	1	3	2	28
8	9	1	3	3	49
9	10	1	4	1	10
10	11	1	4	2	31
11	12	1	4	3	52
12	13	1	5	1	13
13	14	1	5	2	34
14	15	1	5	3	55
15	16	1	6	1	16
16	17	1	6	2	37
17	18	1	6	3	58
18	19	1	7	1	19
19	20	1	7	2	40
20	21	1	7	3	61
21	22	2	1	1	2
22	23	2	1	2	23
23	24	2	1	3	44
24	25	2	2	1	5
25	26	2	2	2	26
26	27	2	2	3	47
27	28	2	3	1	8
28	29	2	3	2	29

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Table 19: Channelized STM1-to-T1 Channel Mapping *(continued)*

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
29	30	2	3	3	50
30	31	2	4	1	11
31	32	2	4	2	32
32	33	2	4	3	53
33	34	2	5	1	14
34	35	2	5	2	35
35	36	2	5	3	56
36	37	2	6	1	17
37	38	2	6	2	38
38	39	2	6	3	59
39	40	2	7	1	20
40	41	2	7	2	41
41	42	2	7	3	62
42	43	3	1	1	3
43	44	3	1	2	24
44	45	3	1	3	45
45	46	3	2	1	6
46	47	3	2	2	27
47	48	3	2	3	48
48	49	3	3	1	9
49	50	3	3	2	30
50	51	3	3	3	51
51	52	3	4	1	12

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Table 19: Channelized STM1-to-T1 Channel Mapping *(continued)*

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
52	53	3	4	2	33
53	54	3	4	3	54
54	55	3	5	1	15
55	56	3	5	2	36
56	57	3	5	3	57
57	58	3	6	1	18
58	59	3	6	2	39
59	60	3	6	3	60
60	61	3	7	1	21
61	62	3	7	2	42
62	63	3	7	3	63
63	64	4	1	1	24
64	65	4	1	2	45
65	66	4	1	3	66
66	67	4	2	1	27
67	68	4	2	2	48
68	69	4	2	3	69
69	70	4	3	1	30
70	71	4	3	2	51
71	72	4	3	3	72
72	73	4	4	1	33
73	74	4	4	2	54
74	75	4	4	3	75

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Table 19: Channelized STM1-to-T1 Channel Mapping *(continued)*

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
75	76	4	5	1	36
76	77	4	5	2	57
77	78	4	5	3	78
78	79	4	6	1	39
79	80	4	6	2	60
80	81	4	6	3	81
81	82	4	7	1	42
82	83	4	7	2	63
83	84	4	7	3	84

Example: Configuring Channelized STM1 Interfaces

The following configuration is sufficient to get the Channelized STM1-to-E1 PIC interface up and running. The channelized STM1-to-E1 interface is an STM1 that is divided into 63 E1 interfaces. E1 interfaces can use the following encapsulation types:

- PPP, PPP CCC, and PPP TCC
- Frame Relay, Frame Relay CCC, and Frame Relay TCC
- Cisco HDLC, Cisco HDLC CCC, and Cisco HDLC TCC

The channels can also have logical interfaces. For information about Frame Relay DLCI limitations for channelized interfaces, see "Data-Link Connection Identifiers on Channelized Interfaces" on page 6. For more information about Frame Relay DLCIs, see *Configuring Frame Relay DLCIs*. For more information about DLCI sparse mode, see the *Junos OS Administration Library for Routing Devices*.

You apply all STM1 interface SONET/SDH options to the first E1 interface in the configuration by including the **sonet-options** statement at the **[edit interfaces e1-*fpc/pic/port:channel*]** hierarchy level:

```
[edit]
interfaces {
   e1-0/0/1:0 {
      encapsulation cisco-hdlc;
      sonet-options {
         no-z0-increment;
      }
```


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```
        e1-options {
            framing g704;
        }
        unit 0 {
            family inet {
                address 10.11.30.1/30;
            }
        }
    }
    e1-0/0/1:1 {
        encapsulation frame-relay;
        e1-options {
            framing g704;
        }
        unit 1 {
            dlci 16;
            family inet {
                address 10.11.31.9/30;
            }
        }
    }
    e1-0/0/1:2 {
        encapsulation ppp;
        no-keepalives;
        unit 0 {
            family inet {
                address 10.11.31.47/30;
            }
        }
    }
}
[edit]
chassis {
    fpc 2 {
        pic 0 {
            vtmapping klm;
        }
    }
}
```

Configuring Channelized STM1 IQ and IQE Interfaces

This section includes the following topics:

- Configuring an STM1 IQ or STM1 IQE Interface on page 194
- Configuring E1 IQ and IQE Interfaces on page 194
- Configuring Fractional E1 IQ and IQE Interfaces on page 195
- Configuring an NxDS0 IQ Interface on page 196
- Example: Configuring Channelized STM1 IQ and IQE Interfaces on page 197

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Configuring an STM1 IQ or STM1 IQE Interface

On a one-port Channelized STM1 IQ PIC, or each individual port of the 4-port Channelized STM1 IQE PIC, you can configure one SDH STM1 interface. To configure an SDH STM1 interface, include the **no-partition interface-type** statement at the **[edit interfaces cstm1-*fpc/pic/port*]** hierarchy level, specifying the **so** interface type:

```
[edit interfaces cstm1-fpc/pic/port]
no-partition interface-type so;
```

This configuration creates interface **so-*fpc/pic/port***.

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ and IQE interfaces. You can only apply CoS rules to the aggregate bit streams.

Configuring E1 IQ and IQE Interfaces

To configure an E1 interface on a Channelized STM1 IQ or IQE PIC, perform the following tasks:

1. Include the **no-partition** and **interface-type** statements at the **[edit interfaces cstm1-*fpc/pic/port*]** hierarchy level, specifying the **cau4** interface type. This converts the channelized STM1 interface into a channelized AU-4 interface. The resulting interface name is **cau4-*fpc/pic/port***:

   ```
   [edit interfaces cstm1-fpc/pic/port]
   no-partition interface-type cau4;
   ```

2. Partition the channelized AU-4 interface into E1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level, specifying the **e1** interface type. This configuration creates interface **e1-*fpc/pic/port*:*channel***. The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized E1 interfaces, the partition number can be from 1 through 63. The interface type is the channelized interface type or clear channel you are creating. For channelized AU-4 interfaces, ***type*** can be **ce1** or **e1**.

   ```
   [edit interfaces cau4-fpc/pic/port]
   partition partition-number interface-type e1;
   ```

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ or IQE interfaces. You can only apply CoS rules to the aggregate bit streams.

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NOTE: For channelized STM1 interfaces, channel numbering begins with 0 (:0). For channelized STM1 IQ and IQE interfaces, channel numbering begins with 1 (:1).

Example: Configuring E1 IQ and IQE Interfaces

Configure the following five E1 interfaces:

e1-0/0/0:1
e1-0/0/0:2
e1-0/0/0:3
e1-0/0/0:4
e1-0/0/0:5

```
[edit interfaces cstm1-0/0/0]
no-partition interface-type cau4;
[edit interfaces cau4-0/0/0]
partition 1-5 interface-type e1;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring Fractional E1 IQ and IQE Interfaces

By default, all the time slots on a channelized E1 interface are used. To configure a fractional E1 interface on a Channelized STM1 IQ or IQE PIC, perform the following tasks:

1. Include the **no-partition** and **interface-type** statements at the **[edit interfaces cstm1-*fpc/pic/port*]** hierarchy level, specifying the **cau4** interface type. This converts the channelized STM1 interface into a channelized AU-4 interface. The resulting interface name is **cau4-*fpc/pic/port***:

   ```
   [edit interfaces cstm1-fpc/pic/port]
   no-partition interface-type cau4;
   ```

2. Partition the channelized AU-4 interface into E1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level, specifying the **e1** interface type. The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized E1 interfaces, the partition number can be from 1 through 63. The interface type is the channelized interface type or clear channel you are creating. For channelized AU-4 interfaces, ***type*** can be **ce1** or **e1**. This configuration creates interface **e1-*fpc/pic/port*:*channel***:

   ```
   [edit interfaces cau4-fpc/pic/port]
   partition partition-number interface-type e1;
   ```

3. Configure the number of time slots allocated to the E1 IQ or IQE interface by including the **timeslots** statement at the **[edit interfaces e1-*fpc/pic/port*:*channel* e1-options]** hierarchy level. *N*xDS0 time slots configured on either a channelized STM1 IQ or IQE interface or channelized E1 IQ or IQE interface are numbered from 1 to 31 (0 is reserved), while fractional E1 time slots range from 2 to 32 (1 is reserved). To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces.

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```
[edit interfaces e1-fpc/pic/port:channel e1-options]
timeslots time-slot-range;
```

NOTE: For channelized STM1 interfaces, channel numbering begins with 0 (:0). For channelized STM1 IQ or IQE interfaces, channel numbering begins with 1 (:1).

For more information about E1 time slots, see *Configuring Fractional E1 Time Slots*.

Example: Configuring Fractional E1 Interfaces

Configure a fractional E1 interface that uses time slots 2 through 10:

```
[edit interfaces cstm1-0/0/0]
no-partition cau4;
[edit interfaces cau4-0/0/0]
partition 1 interface-type e1;
[edit interfaces e1-0/0/0 e1-options]
timeslots 2-10;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring an NxDS0 IQ Interface

By default, all the time slots on a channelized STM1 interface are used. To configure an *N*xDS0 IQ interface on a Channelized STM1 IQ or IQE PIC, perform the following tasks:

1. Include the **no-partition** and **interface-type** statements at the **[edit interfaces cstm1-*fpc/pic/port*]** hierarchy level, specifying the **cau4** interface type. This converts the channelized STM1 interface into a channelized AU-4 interface. The resulting interface name is **cau4-*fpc/pic/port***:

   ```
   [edit interfaces cstm1-fpc/pic/port]
   no-partition interface-type cau4;
   ```

2. Partition the channelized AU-4 interface into E1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces cau4-*fpc/pic/port*]** hierarchy level, specifying the **ce1** interface type. This configuration creates interface **ce1-*fpc/pic/port:channel***. The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized E1 interfaces, the partition number can be from 1 through 63. The interface type is the channelized interface type or clear channel you are creating. For channelized AU-4 interfaces, ***type*** can be **ce1** or **e1**:

   ```
   [edit interfaces cau4-fpc/pic/port]
   partition partition-number interface-type ce1;
   ```

3. Configure the number of time slots allocated to the *N*xDS0 IQ interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces e1-*fpc/pic/port:channel*]** hierarchy level, specifying the **ds** interface type. For channelized E1 IQ interfaces, the partition number range is from 1 through 31. For E1 IQ interfaces (**e1-*fpc/pic/port***), the time-slot range is from 2 through 31. For channelized E1 IQ interfaces (**ce1-*fpc/pic/port***), the time-slot range is from 1 through 31. You can designate

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any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces:

```
[edit interfaces ce1-fpc/pic/port:channel]
partition partition-number timeslots time-slot-range interface-type ds;
```

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ and IQE interfaces. You can only apply CoS rules to the aggregate bit streams.

NOTE: For channelized STM1 interfaces, channel numbering begins with 0 (:0). For channelized STM1 IQ and IQE interfaces, channel numbering begins with 1 (:1).

For more information about E1 time slots, see *Configuring Fractional E1 Time Slots*.

Example: Configuring an NxDS0 IQ Interface

Configure an *N*xDS0 interface that uses time slots 1 through 10. This configuration creates the **ds-0/0/0:1:1** interface.

```
[edit interfaces cstm1-0/0/0]
no-partition interface-type cau4;
[edit interfaces cau4-0/0/0]
partition 1 interface-type ce1;
[edit interfaces ce1-0/0/0:1]
partition 1 timeslots 1-10 interface-type ds;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Example: Configuring Channelized STM1 IQ and IQE Interfaces

Configure STM1, E1, fractional E1, and *N*xDS0 interfaces:

STM1 Interface

```
[edit interfaces]
cstm1-0/0/0 {
   no-partition interface-type so;
}
so-0/0/0 {
   unit 0 {
      family inet {
         address 10.10.12.1/30;
      }
   }
}
```

E1 Interface

```
[edit interfaces]
cstm1-1/1/0 {
   no-partition interface-type cau4;
}
[edit interfaces]
cau4-1/1/0 {
```

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```
  partition 1-63 interface-type e1;
}
[edit interfaces]
e1-1/1/0:1 {
  unit 0 {
    family inet {
      address 10.10.10.1/30;
    }
  }
}
...
```

Fractional E1 Interface

```
[edit interfaces]
cstm1-1/0/0 {
  no-partition interface-type cau4;
}
[edit interfaces]
cau4-1/0/0 {
  partition 1-63 interface-type e1;
}
[edit interfaces]
e1-1/1/0:1 {
  e1-options {
    timeslots 2-10;
  }
  unit 0 {
    family inet {
      address 10.10.10.1/30;
    }
  }
}
...
```

DS0 Interface

```
[edit interfaces]
cstm1-2/0/0 {
  no-partition interface-type cau4;
}
[edit interfaces]
cau4-2/0/0 {
  partition 1-10 interface-type ce1;
}
[edit interfaces]
ce1-2/0/0:1 {
  partition 1 interface-type ds timeslots 2-10;
  [edit interfaces]
  ds-2/0/0:1:1 {
    unit 0 {
      family inet {
        address 10.12.12.1/30;
      }
    }
  }
  ...
}
```


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For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring Link PIC Failover on Channelized STM1 Interfaces

For Channelized STM1 IQ and IQE PICs used as linking PICs in redundant LSQ configurations, you can inhibit the router from sending PPP termination-request messages to the remote host if the link PIC fails. To do this, include the **no-termination-request** statement at the **[edit interfaces *interface-name* ppp-options]** hierarchy level:

```
no-termination-request;
```

The **no-termination-request** statement is supported only with MLPPP and SONET APS configurations and works with PPP, PPP over Frame Relay, and MLPPP interfaces only.

For information about interchassis and intrachassis LSQ failover, see the *Junos OS Services Interfaces Library for Routing Devices*.

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CHAPTER 9

Configuring Channelized T1 Interfaces

- Channelized T1 IQ and IQE Interfaces Overview on page 201
- Configuring Channelized T1 IQ and IQE Interfaces on page 201
- Example: Configuring Channelized T1 IQ and IQE Interfaces on page 205

Channelized T1 IQ and IQE Interfaces Overview

The Channelized T1 intelligent queuing (IQ) and enhanced intelligent queuing (IQE) PICs have 10 T1 ports that you can channelize to the DS0 level. Each T1 interface has 24 DS0 time slots. You can combine DS0 time slots (channels) to create a channel group (*N*xDS0).

The Channelized T1 IQ and IQE PICs are supported on the M7i, M10i, M20, M40e, M120, and M320 routers.

Related Documentation

- Example: Configuring Channelized T1 IQ and IQE Interfaces on page 205

Configuring Channelized T1 IQ and IQE Interfaces

- Configuring T1 IQ and IQE Interfaces on page 201
- Configuring Fractional T1 IQ and IQE Interfaces on page 202
- Configuring NxDS0 IQ and IQE Interfaces on page 203
- Configuring Payload Loopback on page 203
- Configuring Channelized T1 Interface Properties on page 204

Configuring T1 IQ and IQE Interfaces

To configure a T1 interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level:

```
[edit interfaces ct1-fpc/pic/port]
no-partition interface-type t1;
```

This configuration creates the interface **t1-*fpc/pic/port***.

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NOTE: For a T1 (t1-) interface configured on channelized T1 (ct1-) interface on a Channelized T1 IQ or IQE PIC, you can configure the following T1 options, but these options do not take effect for the T1 interface:

- bert-algorithm
- bert-error-rate
- bert-period
- buildout
- framing
- line-encoding
- loopback
- remote-loopback-respond

The T1 interface inherits these option settings from the parent channelized T1 interface.

Configuring Fractional T1 IQ and IQE Interfaces

By default, all the time slots on a channelized T1 interface are used. To configure a fractional T1 interface on a Channelized T1 IQ or IQE PIC, perform the following tasks:

1. Include the **no-partition** statement at the **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level. This configuration creates the interface **t1-*fpc/pic/port***.

   [edit interfaces ct1-*fpc/pic/port*]
   no-partition interface-type t1;

2. Configure the number of time slots allocated to the T1 IQ or IQE interface by including the **timeslots** statement at the **[edit interfaces t1-*fpc/pic/port* t1-options]** hierarchy level. DS0 time slots configured on the channelized T1 IQ or IQE interface are numbered from 1 to 24. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces.

   [edit interfaces t1-*fpc/pic/port* t1-options]
   timeslots *time-slot-range*;

For more information about T1 time slots, see *Configuring Fractional T1 Time Slots*.

Example: Configuring Fractional T1 IQ and IQE Interfaces

Configure a fractional T1 interface that uses time slots 2 through 10:

```
[edit interfaces t1-0/0/0]
no-partition interface-type t1;
[edit interfaces t1-0/0/0 t1-options]
timeslots 1-10;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

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Configuring NxDS0 IQ and IQE Interfaces

By default, all the time slots on a channelized T1 interface are used. To configure an *N*xDS0 IQ or IQE interface on a Channelized T1 IQ or IQE PIC, you must configure the number of time slots allocated to the *N*xDS0 IQ or IQE interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces t1-*fpc/pic/port*]** hierarchy level, specifying the **ds** interface type:

```
[edit interfaces t1-fpc/pic/port]
partition partition-number timeslots time-slot-range interface-type ds;
```

For channelized T1 IQ or IQE interfaces, the partition number range is from 1 through 24.

For channelized T1 IQ or IQE interfaces (**t1-*fpc/pic/port***), the time-slot range is from 1 through 24. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces. For more information about T1 time slots, see *Configuring Fractional T1 Time Slots*.

Example: Configuring an NxDS0 IQ or IQE Interface

Configure an *N*xDS0 interface that uses time slots 2 through 10. This configuration creates the **ds-0/0/0:1** interface.

```
[edit interfaces t1-0/0/0:1]
partition 1 timeslots 1-10 interface-type ds;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring Payload Loopback

Clocking and loopback options are configured at the controller level for all IQ-based and IQE-based interfaces. However, for the channelized T1 IQ or IQE interfaces, configure the payload loopback on the T1 interfaces instead of the channelized T1 IQ or IQE interface. To configure the payload option, include the **loopback payload** statement at the **[edit interfaces t1-*fpc/pic/port* t1-options loopback]** hierarchy level.

By default, all the time slots on a channelized T1 IQ or IQE interface are used. There can be a maximum of 24 channel groups per channelized T1 IQ or IQE interface. Thus, you can configure a maximum of 240 channel groups per PIC.

To specify the DS0 channel group number in the interface name, include a colon (**:**) as a separator. For example, a Channelized T1 IQ or IQE PIC might have the following physical and virtual interfaces:

```
ds-0/0/0:x
```

x is a DS0 channel group from 1 through 24 (for more information about ranges, see Table 20 on page 204).

You can use any of the values within the range available for ***x***; you do not have to configure the links sequentially. In addition, the Junos OS applies the interface options you configure according to the following rules:

- To configure the **t1-options** statement, you must set channel group ***x*** to **0**:

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ds-0/0/0:0

- There are no restrictions on configuring the **ds0-options** statement.
- If you delete a configuration you previously committed for channel group 0, the options return to default values.

To configure the channel groups and time slots for a channelized T1 IQ or IQE interface, include the following statements at the **[edit chassis]** hierarchy level:

```
[edit chassis]
fpc slot-number {
  pic pic-number {
    ct1 {
      t1 link-number {
        channel-group group-number;
        timeslots time-slot-range;
      }
    }
  }
}
```

There are 24 time slots on a T1 interface. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces.

Table 20 on page 204 shows the ranges you can specify.

Table 20: Ranges for Channelized T1 IQ Configuration

Item	Option	Range
FPC slot	***slot-number***	0 through 7
PIC slot	***pic-number***	0 through 3
T1 port	***port-number***	0 through 9
DS0 channel group	***partition***	1 through 24
Time slot	***time-slot-range***	1 through 24

The theoretical maximum number of channel groups possible per PIC is 10 * 24 = 240. This is within the maximum bandwidth available.

Configuring Channelized T1 Interface Properties

To configure channelized T1 IQ or IQE interface properties, include the **t1-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
t1-options {
  byte-encoding (nx56 | nx64)
  fcs (16 | 32);
  framing (esf | sf);
```


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```
    idle-cycle-flag (flags | ones);
    invert-data;
    line-encoding (ami | b8zs);
    loopback (local | payload | remote);
    start-end-flag (filler | shared);
}
```

NOTE: If you configure the line-encoding statement with the ami option and the byte-encoding statement with the nx64 option, excessive zeros in the payload area may bring the interface down. To prevent this, configure the byte-encoding statement with the nx56 option or include the invert-data statement.

To specify options for each of the DS0 channels, include the **ds0-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
ds0-options {
    byte-encoding (nx56 | nx64);
    fcs (16 | 32);
    idle-cycle-flag (flags | ones);
    loopback payload;
    start-end-flag (filler | shared);
}
```

Only a subset of the T1 options is valid for the channelized configuration; you specify the time slots using the **[edit chassis]** configuration described in *Examples: Interface Naming*. For more information about the T1 and DS0 options, see *T1 Interfaces Overview*.

Each T1 interface has 24 time slots (DS0s). You can combine one or more of these DS0 time slots (channels) to create a channel group (*N*xDS0). There can be a maximum of 24 channel groups per T1 interface.

Example: Configuring Channelized T1 IQ and IQE Interfaces

Configure a channelized T1 interface as an unpartitioned, clear channel.

Configuring a T1 Interface

```
[edit interfaces]
ct1-2/0/0 {
    no-partition interface-type t1; # t1-2/0/0
}
```

Configure a partitioned channel group.

Configuring a Channel Group

```
[edit interfaces]
ct1-0/0/1 {
    partition 1 interface-type ds0 timeslots 1-10;
    partition 2interface-type ds0 timeslots 11-20;
}
```

The following configuration is sufficient to get the channelized T1 IQ or IQE interface up and running:

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Configuring Multiple Interface Types

```
[edit]
interfaces {
   ct1-1/2/3 {
      partition 1 timeslots 10 interface-type ds; # ds-1/2/3:1
      partition 2 timeslots 1-9 interface-type ds; # ds-1/2/3:2
   }
   ds-1/2/3:1 {
      unit 0 {
         family inet {
            address 10.25.1.2/24;
         }
      }
   }
   ds-1/2/3:2 {
      unit 0 {
         family inet {
            address 10.25.2.2/24;
         }
      }
   }
}
[edit]
interfaces {
   ct1-1/2/6 {
      no-partition interface-type t1; # t1-1/2/6
   }
   t1-1/2/6 {
      t1-options {
         timeslots 1-2;
      }
      unit 0 {
         family inet {
            address 10.255.126.2/24;
         }
      }
   }
}
```

Related Documentation

- Configuring Channelized T1 IQ and IQE Interfaces on page 201

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CHAPTER 10

Configuring Channelized T3 Interfaces

- Configuring the Junos OS to Enable Channelization on DS3/E3 MIC on page 207
- Configuring the Channelized T3 Loop Timing on page 209
- Configuring Channelized T3 IQ Interfaces on page 209
- Example: Configuring Channelized T3 IQ Interfaces on page 212
- Configuring Channelized DS3-to-DS0 Interfaces on page 213
- Examples: Configuring Channelized DS3-to-DS0 Interfaces on page 216
- Configuring Channelized DS3-to-DS1 Interfaces on page 219
- Examples: Configuring Channelized DS3-to-DS1 Interfaces on page 220

Configuring the Junos OS to Enable Channelization on DS3/E3 MIC

By default, the DS3/E3 MIC functions in clear-channel mode. To enable the DS3/E3 MIC to function in channelized mode, you need to use the software license S-MIC-3D-8CHDS3. To enable channelization, set the **channelization** statement at the **[edit chassis fpc *MPC-slot-number* pic *MIC-slot-number*]** hierarchy level. You can use the **channelization** option to channelize only individual DS3 interfaces.

NOTE:

- You can configure the **channelization** statement to enable channelization for the DS3/E3 MIC only. Moreover, you can use the **channelization** statement only on MX Series routers with Queuing and Enhanced Queuing MPCs (MX-MPC1-3D-Q, MX-MPC2-3D-Q, and MX-MPC2-3D-EQ) or on MX80 routers. Configuring the **channelization** statement on other MPCs does not have any effect, and the MICs continue to operate in clear-channel mode.
- Only clear-channel E3 mode is supported on the DS3/E3 MIC. Therefore, configuring the **channelization** statement does not impact the E3 functionality.

To configure channelization on the DS3/E3 MIC:

1. At the **[edit chassis]** hierarchy level in configuration mode, navigate to the hierarchy level that indicates the slot on which the DS3/E3 MIC is located.

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```
[edit chassis]
user@host# edit fpc MPC-slot-number pic MIC-slot-number
```

For example, to navigate to the **[edit chassis fpc 1 pic 2]** hierarchy level:

```
[edit chassis]
user@host# edit fpc 1 pic 2
```

2. Configure the **channelization** statement.

```
[edit chassis fpc MPC-slot-number pic MIC-slot-number]
user@host# set channelization
```

For example:

```
[edit chassis fpc 1 pic 2]
user@host# set channelization
```

3. Verify the configuration by using the **show** command at the **[edit chassis]** hierarchy level:

```
[edit chassis]
user@host# show
fpc 1 {
    pic 2 {
        channelization;
    }
}
```

To enable the DS3/E3 MIC to function in clear-channel mode, you need to disable channelization. To do this, delete the **channelization** option at the **[chassis fpc *MPC-slot-number* pic *MIC-slot-number*]** hierarchy level.

To disable channelization on the DS3/E3 MIC:

1. At the **[edit chassis]** hierarchy level in configuration mode, navigate to the hierarchy level that indicates the slot on which the DS3/E3 MIC is located.

```
[edit chassis]
user@host# edit fpc MPC-slot-number pic MIC-slot-number
```

For example:

```
[edit chassis]
user@host# edit fpc 1 pic 2
```

2. Delete the **channelization** statement.

```
[edit chassis fpc MPC-slot-number pic MIC-slot-number]
user@host# delete channelization
```

For example:

```
[edit chassis fpc 1 pic 2]
user@host# delete channelization
```

Related Documentation

- channelization on page 379

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Configuring the Channelized T3 Loop Timing

By default, internal clocking (line timing) is used on channelized IQ and IQE interfaces. To configure SONET/SDH or DS3-level external clocking, include the **loop-timing** statement:

```
loop-timing;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces ct3-*fpc/pic/port* t3-options]**
- **[edit interfaces stm1-*fpc/pic/port* sonet-options]**

To explicitly configure the default line timing, include the **no-loop-timing** statement in the configuration:

```
no-loop-timing;
```

The **loop-timing** and **no-loop-timing** statements apply only to E1 and T1 interfaces you configure on channelized IQ and IQE PICs. If you attempt to include these statements on any other interface type, they are ignored.

For all channelized IQ and IQE PICs, the **clocking** statement is supported on all channels. To configure clocking on individual interfaces, include the **clocking** statement at the **[edit interfaces *type-fpc/pic/port*:*channel*]** hierarchy level. If you do not include the **clocking** statement, the individual interfaces use internal clocking by default.

For more information, see *Configuring the Clock Source*.

Configuring Channelized T3 IQ Interfaces

NOTE: Class-of-service (CoS) rules cannot be applied to an individual channel configured on channelized IQ interfaces. You can only apply CoS rules to the aggregate bit streams.

This section describes how to configure channelized T3 intelligent queuing (IQ) interfaces, discussing the following topics:

- Configuring T3 IQ Interfaces on page 209
- Configuring T1 IQ Interfaces on page 210
- Configuring Fractional T1 IQ and IQE Interfaces on page 210
- Configuring an NxDS0 IQ Interface on page 211

Configuring T3 IQ Interfaces

To configure a T3 interface, include the **no-partition** and **interface-type** statements at the **[edit interfaces ct3-*fpc/pic/port*]** hierarchy level:

```
[edit interfaces ct3-fpc/pic/port]
```

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```
no-partition interface-type t3;
```

This configuration creates interface **t3-*fpc/pic/port***.

Configuring T1 IQ Interfaces

On a Channelized DS3 IQ or IQE Physical Interface Card (PIC), you can create up to 112 T1 interfaces. To configure a T1 interface on a Channelized DS3 IQ or IQE PIC, include the **partition** and **interface-type** statements at the **[edit interfaces ct3-*fpc/pic/port*]** hierarchy level, specifying the **t1** interface type:

```
[edit interfaces ct3-fpc/pic/port]
partition partition-number interface-type t1;
```

This configuration creates interface **t1-*fpc/pic/port*:*channel***.

The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized T3 interfaces, the partition number can be from 1 through 28.

NOTE: For channelized T3 interfaces, channel numbering begins with 0 (:0). For channelized T3 IQ and IQE interfaces, channel numbering begins with 1 (:1).

The interface type is the channelized interface type or clear channel you are creating. For channelized T3 interfaces, ***type*** can be **ct1** or **t1**.

Example: Configuring T1 IQ and IQE Interfaces

Configure the following five T1 interfaces:

t1-0/0/0:1
t1-0/0/0:2
t1-0/0/0:3
t1-0/0/0:4
t1-0/0/0:5

```
[edit interfaces ct3-0/0/0]
partition 1-5 interface-type t1;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring Fractional T1 IQ and IQE Interfaces

By default, all the time slots on a channelized T1 interface are used. To configure a fractional T1 interface on a Channelized DS3 IQ or IQE PIC, perform the following tasks:

1. Configure a T1 IQ interface. For more information, see "Configuring T1 IQ Interfaces" on page 210.

   This configuration creates interface **t1-*fpc/pic/port*:*channel***.

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2. Configure the number of time slots allocated to the T1 IQ interface by including the **timeslots** statement at the **[edit interfaces t1-*fpc/pic/port*:*channel* t1-options]** hierarchy level:

   ```
   [edit interfaces t1-fpc/pic/port t1-options]
   timeslots time-slot-range;
   ```

For channelized T1 IQ interfaces, the time-slot range is from 1 through 24. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces. For more information about T1 time slots, see *Configuring Fractional T1 Time Slots*.

Example: Configuring Fractional T1 IQ Interfaces

Configure a fractional T1 interface that uses time slots 1 through 10:

```
[edit interfaces ct3-0/0/0:1]
partition 1 interface-type t1;
[edit interfaces t1-0/0/0:1:1 t1-options]
timeslots 1-10;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Configuring an NxDS0 IQ Interface

By default, all the time slots on a channelized T3 interface are used. To configure an *N*xDS0 IQ interface on a Channelized DS3 IQ or IQE PIC, perform the following tasks:

1. Partition the channelized T3 interface into channelized T1 interfaces by including the **partition** and **interface-type** statements at the **[edit interfaces ct3-*fpc/pic/port*]** hierarchy level, specifying the **ct1** interface type:

   ```
   [edit interfaces ct3-fpc/pic/port]
   partition partition-number interface-type ct1;
   ```

   This configuration creates interface **ct1-*fpc/pic/port*:*channel***.

   The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized T1 interfaces, the partition number can be from 1 through 28.

   The interface type is the channelized interface type or clear channel you are creating. For channelized T3 interfaces, ***type*** can be **ct1** or **t1**.

   NOTE: For channelized T3 interfaces, channel numbering begins with 0 (:0). For channelized T3 IQ interfaces, channel numbering begins with 1 (:1).

2. Configure the number of time slots allocated to the *N*xDS0 IQ interface by including the **partition**, **timeslots**, and **interface-type** statements at the **[edit interfaces ct1-*fpc/pic/port*:*channel*]** hierarchy level, specifying the **ds** interface type:

   ```
   [edit interfaces ct1-fpc/pic/port:channel]
   partition partition-number timeslots time-slot-range interface-type ds;
   ```

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For channelized T1 IQ interfaces, the partition number range is from 1 through 28; the time-slot range is from 1 through 24. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces. For more information about T1 time slots, see *Configuring Fractional T1 Time Slots*.

Example: Configuring an NxDS0 IQ Interface

Configure the following two *N*xDS0 interfaces with 10 time slots and 4 time slots, respectively:

ds-0/0/0:1:1
ds-0/0/0:1:2

```
[edit interfaces ct3-0/0/0]
partition 1 interface-type ct1;
[edit interfaces ct1-0/0/0:1]
partition 1 timeslots 1-10 interface-type ds;
partition 2 timeslots 12-16 interface-type ds;
```

For a full configuration example, see the *Junos OS, Release 14.1*.

Example: Configuring Channelized T3 IQ Interfaces

Configure a channelized T3 interface as an unpartitioned, clear channel.

Configuring a T3 Interface

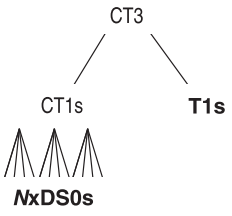
```
[edit interfaces]
ct3-5/0/0 {
   no-partition interface-type t3;
}
```

Configuring NxDS0 and T1 Interfaces

Figure 38 on page 212 shows the following interfaces on a Channelized DS3 IQ or IQE PIC:

- A channelized T1, which is partitioned into *N*xDS0 interfaces
- T1 interfaces

Figure 38: Sample Channelization of DS3 IQ or IQE PIC




```
[edit interfaces]
ct3-1/1/0 {
   description “CT3 to CT1 and CT3 to T1.”;
   t3-options {
      loopback remote;
```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```
    looptiming;
  }
  partition 1 interface-type ct1; # ct1-1/1/0:1.
  partition 2-28 interface-type t1; # t1-1/1/0:[2-28]
}
ct1-1/1/0:1 {
  description “case (a) CT1s to NxDSOs.”;
  t1-options {
    bert-algorithm all-ones-repeating;
    framing sf;
    line-encoding ami;
  }
  partition 1 timeslots 2 - 10 interface-type ds0; # ds-1/1/0:1:1, channel group with 10 DS0s
  partition 2 timeslots 11- 23 interface-type ds0; # ds-1/1/0:1:2, channel group with 13 DS0s
  ...
}
```

Related Documentation

- Configuring Channelized T3 IQ Interfaces on page 209

Configuring Channelized DS3-to-DS0 Interfaces

For channelized interfaces, you can configure 28 T1 channels per T3 interface. Each T1 link can have up to eight DS0 channel groups, and each channel group can hold any combination of DS0 time slots. To specify the T1 link and DS0 channel group number in the interface name, use colons (:) as separators. For example, a Multichannel DS3 PIC might have the following physical and virtual interfaces:

ds-0/0/0:*x*:*y*

where ***x*** is a T1 link ranging from 0 through 27 and ***y*** is a DS0 channel group from 0 through 7. For more information about ranges, see Table 21 on page 214.

You can use any of the values within the range available for ***x*** and ***y***, and you do not have to configure the links sequentially. In addition, the Junos OS applies the interface options you configure according to the following rules:

- To configure the T1 options, you must set channel group ***y*** to 0; the T1 link ***x*** can be any value:

  ds-0/0/0:*x*:0

- To configure the T3 options, you must set the T1 link ***x*** to 0 and channel group ***y*** to 0:

  ds-0/0/0:0:0

- There are no restrictions on configuring the DS0 options.
- If you delete a configuration you previously committed for channel group 0, the options return to default values.

By default, all the time slots are used. To configure the channel groups and time slots for a channelized DS3-to-DS0 interface, include the **channel-group** and **timeslots** statements at the **[edit chassis fpc *slot-number* pic *pic-number* ct3 port *port-number* t1 *link-number*]** hierarchy level:

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[edit chassis fpc *slot-number* pic *pic-number* ct3 port *port-number* t1 *link-number*]
channel-group *group-number*;
timeslots *time-slot-range*;

NOTE: If you commit the interface name but do not include the **[edit chassis]** configuration, the channelized DS3-to-DS0 interface behaves like a channelized DS3-to-DS1 interface: none of the DS0 functionality is accessible.

Table 21 on page 214 shows the ranges you can specify for each of the elements in the preceding configuration.

Table 21: Ranges for Channelized DS3-to-DS0 Configuration

Item	Option	Range
FPC slot	**slot-number**	0 through 7 (see note below)
PIC slot	**pic-number**	0 through 3
Port	**port-number**	0 through 1
T1 link	**link-number**	0 through 27
DS0 channel group	**group-number**	0 through 7
Time slot	**time-slot-range**	1 through 24

NOTE: The FPC slot range depends on the router. For a routing matrix, the range is from 0 through 31. For M40, M40e, M160, M320, M120, and other T Series routers, the range is from 0 through 7. For M20 routers, the range is from 0 through 3. For M10 and M10i routers the range is from 0 through 1. For M5 and M7i routers, the only applicable value is 0.

Bandwidth limitations restrict the interface to a maximum of 128 channel groups per T3 port, rather than the theoretical maximum of 8 * 28 = 224.

There are 24 time slots on a T1 interface. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces. You can use each time slot number on only one channel group within the same T1 link.

To configure channelized DS3-to-DS0 interface properties, you can include the **t3-options**, **t1-options**, and **ds0-options** statements. Only a subset of the T3 options are valid for this configuration, and the **buildout**, **invert-data**, and **line-encoding** statements at the **[edit interfaces *interface-name* t1-options]** hierarchy level are ignored. Likewise, only a subset of the DS0 options are valid for this configuration, and the **bert-algorithm**, **bert-error-rate**, **bert-period**, and **loopback payload** statements at the **[edit interfaces**

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interface-name **ds0-options]** hierarchy level are ignored. The following configurations list all the valid parameters.

NOTE: The set of options the Junos OS applies to the interface depends on how you specify the interface name. For more information, see "Examples: Configuring Channelized DS3-to-DS0 Interfaces" on page 216.

To specify options for the T3 side of the connection, include the **t3-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
t3-options {
   bert-algorithm algorithm;
   bert-error-rate rate;
   bert-period seconds;
   (cbit-parity | no-cbit-parity);
   (long-buildout | no-long-buildout);
   loopback (local | payload | remote);
}
```

The statements at the **t3-options** hierarchy are supported only for channel 0; they are ignored if configured on other channels. To specify options for each of the T1 channels, include the **t1-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
t1-options {
   byte-encoding (nx56 | nx64);
   fcs (16 | 32);
   framing (esf | lf);
   idle-cycle-flag (flags | ones);
   invert-data;
   loopback (local | payload | remote);
   start-end-flag (filler | shared);
   timeslots time-slot-number;
}
```

To specify options for each of the DS0 channels, include the **ds0-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
ds0-options {
   bert-algorithm algorithm;
   bert-error-rate rate;
   bert-period seconds;
   byte-encoding (nx56 | nx64);
   fcs (16 | 32);
   idle-cycle-flag (flags | ones);
   invert-data;
   loopback payload;
   start-end-flag (filler | shared);
}
```

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For more information about specific parameters, see *E1 Interfaces Overview*, *E3 Interfaces Overview*, *T1 Interfaces Overview*, and *T3 Interfaces Overview*. For a configuration example, see "Examples: Configuring Channelized DS3-to-DS0 Interfaces" on page 216.

For information about Frame Relay DLCI limitations for channelized interfaces, see "Data-Link Connection Identifiers on Channelized Interfaces" on page 6. For more information about Frame Relay DLCIs, see *Configuring Frame Relay DLCIs*. For more information about DLCI sparse mode, see the *Junos OS Administration Library for Routing Devices*.

Each T1 link can have up to eight DS0 channel groups, and each channel group can hold any combination of DS0 time slots.

Related Documentation

Examples: Configuring Channelized DS3-to-DS0 Interfaces

The following configuration is sufficient to get the channelized DS3-to-DS0 interface up and running. The T3 interface can be divided into 28 channels, each at T1 line rate. DS3 channels can use the following encapsulation types for their logical interfaces:

- PPP, PPP CCC, and PPP TCC
- Frame Relay, Frame Relay CCC, and Frame Relay TCC
- Cisco HDLC, Cisco HDLC CCC, and Cisco HDLC TCC

For more information, see *Configuring Frame Relay DLCIs*.

NOTE: All these configuration examples specify channel group 0 in the interface address, which is required for configuring the **t3-options** and **t1-options** statements.

Configuring Cisco HDLC Encapsulation on a Channelized DS3-to-DS0 Interface

```
[edit interfaces]
ds-2/0/1:20:0 {
   encapsulation cisco-hdlc;
   unit 0 {
      family inet {
         address 10.0.4.40/32 {
            destination 10.0.4.41;
         }
      }
   }
}
[edit chassis]
fpc 2 {
   pic 0 {
      ct3 {
         port 1 {
            t1 20 {
               channel-group 0 timeslots 1-5;
```


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```
        }
      }
    }
  }
}
```

Configuring PPP Encapsulation on a Channelized DS3-to-DS0 Interface

```
[edit interfaces]
ds-2/0/1:20:0 {
  encapsulation ppp;
  unit 0 {
    family inet {
      address 10.0.4.40/32 {
        destination 10.0.4.41;
      }
    }
  }
}
[edit chassis]
fpc 2 {
  pic 0 {
    ct3 {
      port 1 {
        t1 20 {
          channel-group 0 timeslots 1-5;
        }
      }
    }
  }
}
```

Configuring Three Frame Relay DLCIs on a Channelized DS3 Interface

```
[edit interfaces]
t1-5/1/3:0 {
  mtu 9192;
  encapsulation frame-relay;
  unit 1 {
    dlci 101;
    family inet {
      mtu 9000;
      address 10.123.1.2/32 {
        destination 10.123.1.1;
      }
    }
    family iso {
      mtu 9000;
    }
    family mpls {
      mtu 9000;
    }
  }
  unit 2 {
    dlci 102;
    family inet {
      mtu 9000;
      address 10.123.1.4/32 {
        destination 10.123.1.3;
```

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```
        }
      }
      family iso {
        mtu 9000;
      }
      family mpls {
        mtu 9000;
      }
    }
    unit 3 {
      dlci 103;
      family inet {
        mtu 9000;
        address 10.123.1.6/32 {
          destination 10.123.1.5;
        }
      }
      family iso {
        mtu 9000;
      }
      family mpls {
        mtu 9000;
      }
    }
}
```

Configuring Cisco HDLC Encapsulation with Byte-Encoding

```
[edit interfaces ds-0/1/0:5:0]
no-keepalives;
encapsulation cisco-hdlc;
ds0-options {
  byte-encoding nx56;
}
unit 0 {
  family inet {
    address 10.221.2.8/24;
  }
}
```

Configuring Cisco HDLC Encapsulation with Byte-Encoding and Framing

```
[edit interfaces ds-0/1/0:5:0]
no-keepalives;
encapsulation cisco-hdlc;
t1-options {
  byte-encoding nx56;
  framing sf;
}
unit 0 {
  family inet {
    address 10.221.2.8/24;
  }
}
```

Use Time Slots 1 Through 10

```
[edit chassis fpc slot-number pic pic-number ct3 port port-number t1 link-number]
channel-group group-number;
timeslots 1-10;
```


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Use Time Slots 1 Through 5, 10, and 24

[edit chassis fpc *slot-number* pic *pic-number* ct3 port *port-number* t1 *link-number*]
channel-group *group-number*;
timeslots 1-5,10,24;

Related Documentation

Configuring Channelized DS3-to-DS1 Interfaces

You can configure 28 T1 channels per T3 interface, and each interface can have logical interfaces. To specify the channel number, include it after the colon (:) in the interface name. For example, a 4-port T3 PIC in FPC 1 and slot 1 will have the following physical interfaces, depending on the media type:

t1-1/1/0:*x*
t1-1/1/1:*x*
t1-1/1/2:*x*
t1-1/1/3:*x*

where ***x*** is a channel number ranging from 0 through 27.

To configure channelized DS3-to-DS1 interface properties, you can include both the **t1-options** and **t3-options** statements. Only a subset of the T3 options is valid for this configuration, and the **buildout**, **invert-data**, and **line-encoding** statements at the **[edit interfaces *interface-name* t1-options]** hierarchy level are ignored. Likewise, only a subset of the DS0 options are valid for this configuration, and the **bert-algorithm**, **bert-error-rate**, **bert-period**, and **loopback payload** statements at the **[edit interfaces *interface-name* ds0-options]** hierarchy level are ignored. The following configuration lists all the valid parameters.

To specify options for the T3 side of the connection, include the **t3-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
t3-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  (cbit-parity | no-cbit-parity);
  (feac-loop-respond | no-feac-loop-respond);
  loopback (local | payload | remote);
}
```

The statements in the **t3-options** hierarchy are supported only for channel 0; they are ignored if configured on other channels.

To specify options for each of the T1 channels, include the **t1-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
t1-options {
  byte-encoding (nx56 | nx64);
  fcs (16 | 32);
  framing (sf | esf);
```

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```
    idle-cycle-flag (flags | ones);
    loopback (local | payload | remote);
    start-end-flag (filler | shared);
    timeslots time-slot-number;
}
```

For T1 channels on a channelized T3 interface, the **clocking** statement is supported only for channel 0; it is ignored if included in the configuration of channels 1 through 11. The clock source configured for channel 0 applies to all channels on the channelized T3 interface. The individual T1 channels use a gapped 45-MHz clock as the transmit clock. When you configure the clock source for a channelized interface—**ds-*fpc/pic/port*:0**, for example—you must also include the **channel-group** statement at the **[edit chassis]** hierarchy level, and specify channel group 0. For more information, see "Clock Sources on Channelized Interfaces" on page 8.

For information about Frame Relay DLCI limitations for channelized interfaces, see "Data-Link Connection Identifiers on Channelized Interfaces" on page 6. For more information about Frame Relay DLCIs, see *Configuring Frame Relay DLCIs*. For more information about DLCI sparse mode, see the *Junos OS Administration Library for Routing Devices*.

For more information about specific parameters, see *T1 Interfaces Overview* and *T3 Interfaces Overview*. For a configuration example, see "Examples: Configuring Channelized DS3-to-DS1 Interfaces" on page 220.

Related Documentation

Examples: Configuring Channelized DS3-to-DS1 Interfaces

The following configuration is sufficient to get the channelized DS3-to-DS1 interface up and running. The T3 interface can be divided into 28 channels, each at T1 line rate. DS3 channels can use the following encapsulation types for their logical interfaces:

- PPP, PPP CCC, and PPP TCC
- Frame Relay, Frame Relay CCC, and Frame Relay TCC
- Cisco HDLC, Cisco HDLC CCC, and Cisco HDLC TCC

For more information, see *Configuring Frame Relay DLCIs*.

Configuring Cisco HDLC Encapsulation on a Channelized DS3 Interface

```
[edit interfaces]
t1-2/0/1:20 {
    encapsulation cisco-hdlc;
    unit 0 {
        family inet {
            address 10.0.4.40/32 {
                destination 10.0.4.41;
            }
        }
    }
}
```

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Configuring PPP Encapsulation on a Channelized DS3 Interface

```
[edit interfaces]
t1-2/0/1:20 {
  encapsulation ppp;
  unit 0 {
    family inet {
      address 10.0.4.40/32 {
        destination 10.0.4.41;
      }
    }
  }
}
```

Configuring Five Frame Relay DLCIs on a Channelized DS3 Interface

```
[edit interfaces]
t1-5/1/3:0 {
  mtu 9192;
  encapsulation frame-relay;
  unit 1 {
    dlci 101;
    family inet {
      mtu 9000;
      address 10.123.1.2/32 {
        destination 10.123.1.1;
      }
    }
    family iso {
      mtu 9000;
    }
    family mpls {
      mtu 9000;
    }
  }
  unit 2 {
    dlci 102;
    family inet {
      mtu 9000;
      address 10.123.1.4/32 {
        destination 10.123.1.3;
      }
    }
    family iso {
      mtu 9000;
    }
    family mpls {
      mtu 9000;
    }
  }
  unit 3 {
    dlci 103;
    family inet {
      mtu 9000;
      address 10.123.1.6/32 {
        destination 10.123.1.5;
      }
    }
    family iso {
```

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```
        mtu 9000;
      }
      family mpls {
        mtu 9000;
      }
    }
    unit 4 {
      dlci 104;
      family inet {
        mtu 9000;
        address 10.123.1.8/32 {
          destination 10.123.1.7;
        }
      }
      family iso {
        mtu 9000;
      }
      family mpls {
        mtu 9000;
      }
    }
    unit 5 {
      dlci 105;
      family inet {
        mtu 9000;
        address 10.123.1.10/32 {
          destination 10.123.1.9;
        }
      }
      family iso {
        mtu 9000;
      }
      family mpls {
        mtu 9000;
      }
    }
  }
```

Configuring Cisco HDLC Encapsulation with Byte-Encoding

```
[edit interfaces t1-1/1/0:1]
no-keepalives;
encapsulation cisco-hdlc;
t1-options {
  byte-encoding nx56;
}
unit 0 {
  family inet {
    address 10.221.2.8/24;
  }
}
```

Configuring Cisco HDLC Encapsulation with Byte-Encoding and Framing

```
[edit interfaces t1-1/1/0:1]
no-keepalives;
encapsulation cisco-hdlc;
t1-options {
  byte-encoding nx56;
```


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```
    framing sf;
}
unit 0 {
    family inet {
        address 10.221.2.8/24;
    }
}
```

Related Documentation

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PART 3

Troubleshooting Information

- General Troubleshooting Information on page 227
- Troubleshooting Channelized DS3 Interfaces on page 239
- Troubleshooting Multichannel DS3 Interfaces on page 269
- Troubleshooting Channelized OC12 Interfaces on page 299

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CHAPTER 11

General Troubleshooting Information

- Interface Diagnostics on page 227
- Investigating Interface Steps and Commands on page 234

Interface Diagnostics

You can use two diagnostic tools to test the physical layer connections of interfaces: loopback testing and bit error rate test (BERT) testing. Loopback testing enables you to verify the connectivity of a circuit. BERT testing enables you to identify poor signal quality on a circuit. This section contains the following topics:

- Configuring Loopback Testing on page 227
- Interface Diagnostics on page 229

Configuring Loopback Testing

Loopback testing allows you to verify the connectivity of a circuit. You can configure any of the following interfaces to execute a loopback test: Aggregated Ethernet, Fast Ethernet, Gigabit Ethernet, E1, E3, *N*xDS0, serial, SONET/SDH, T1, and T3.

The physical path of a network data circuit usually consists of segments interconnected by devices that repeat and regenerate the transmission signal. The transmit path on one device connects to the receive path on the next device. If a circuit fault occurs in the form of a line break or a signal corruption, you can isolate the problem by using a loopback test. Loopback tests allow you to isolate segments of the circuit and test them separately.

To do this, configure a *line loopback* on one of the routers. Instead of transmitting the signal toward the far-end device, the line loopback sends the signal back to the originating router. If the originating router receives back its own data link layer packets, you have verified that the problem is beyond the originating router. Next, configure a line loopback farther away from the local router. If this originating router does not receive its own data link layer packets, you can assume the problem is on one of the segments between the local router and the remote router's interface card. In this case, the next troubleshooting step is to configure a line loopback closer to the local router to find the source of the problem.

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There are several types of loopback testing supported by the Junos OS, as follows:

- DCE local—Loops packets back on the local DCE.
- DCE remote—Loops packets back on the remote DCE.
- Local—Useful for troubleshooting physical PIC errors. Configuring local loopback on an interface allows transmission of packets to the channel service unit (CSU) and then to the circuit toward the far-end device. The interface receives its own transmission, which includes data and timing information, on the local router's PIC. The data received from the CSU is ignored. To test a local loopback, issue the **show interfaces *interface-name*** command. If PPP keepalives transmitted on the interface are received by the PIC, the **Device Flags** field contains the output **Loop-Detected**.
- Payload—Useful for troubleshooting the physical circuit problems between the local router and the remote router. A payload loopback loops data only (without clocking information) on the remote router's PIC. With payload loopback, overhead is recalculated.
- Remote—Useful for troubleshooting the physical circuit problems between the local router and the remote router. A remote loopback loops packets, including both data and timing information, back on the remote router's interface card. A router at one end of the circuit initiates a remote loopback toward its remote partner. When you configure a remote loopback, the packets received from the physical circuit and CSU are received by the interface. Those packets are then retransmitted by the PIC back toward the CSU and the circuit. This loopback tests all the intermediate transmission segments.

Table 22 on page 228 shows the loopback modes supported on the various interface types.

Table 22: Loopback Modes by Interface Type

Interface	Loopback Modes	Usage Guidelines
Aggregated Ethernet, Fast Ethernet, Gigabit Ethernet	Local	*Configuring Ethernet Loopback Capability*
Circuit Emulation E1	Local and remote	*Configuring E1 Loopback Capability*
Circuit Emulation T1	Local and remote	*Configuring T1 Loopback Capability*
E1 and E3	Local and remote	*Configuring E1 Loopback Capability* and *Configuring E3 Loopback Capability*
*N*xDS0	Payload	"Configuring NxDS0 IQ and IQE Interfaces" on page 34, "Configuring T1 and NxDS0 Interfaces" on page 126, "Configuring NxDS0 Interfaces" on page 142, "Configuring an NxDS0 IQ Interface" on page 196, and "Configuring an NxDS0 IQ Interface" on page 211
Serial (V.35 and X.21)	Local and remote	*Configuring Serial Loopback Capability*

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Table 22: Loopback Modes by Interface Type *(continued)*

Interface	Loopback Modes	Usage Guidelines
Serial (EIA-530)	DCE local, DCE remote, local, and remote	*Configuring Serial Loopback Capability*
SONET/SDH	Local and remote	*Configuring SONET/SDH Loopback Capability*
T1 and T3	Local, payload, and remote	*Configuring T1 Loopback Capability* and *Configuring T3 Loopback Capability* See also *Configuring the T1 Remote Loopback Response*

To configure loopback testing, include the **loopback** statement:

loopback *mode*;

You can include this statement at the following hierarchy levels:

- **[edit interfaces** *interface-name* **aggregated-ether-options]**
- **[edit interfaces** *interface-name* ds0-options**]**
- **[edit interfaces** *interface-name* e1-options**]**
- **[edit interfaces** *interface-name* **e3-options]**
- **[edit interfaces** *interface-name* **fastether-options]**
- **[edit interfaces** *interface-name* **gigether-options]**
- **[edit interfaces** *interface-name* **serial-options]**
- **[edit interfaces** *interface-name* sonet-options**]**
- **[edit interfaces** *interface-name* t1-options**]**
- **[edit interfaces** *interface-name* t3-options**]**

Interface Diagnostics

BERT allows you to troubleshoot problems by checking the quality of links. You can configure any of the following interfaces to execute a BERT when the interface receives a request to run this test: E1, E3, T1, T3; the channelized DS3, OC3, OC12, and STM1 interfaces; and the channelized DS3 IQ, E1 IQ, and OC12 IQ interfaces.

A BERT test requires a line loop to be in place on either the transmission devices or the far-end router. The local router generates a known bit pattern and sends it out the transmit path. The received pattern is then verified against the sent pattern. The higher the bit error rate of the received pattern, the worse the noise is on the physical circuit. As you move the position of the line loop increasingly downstream toward the far-end router, you can isolate the troubled portion of the link.

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To configure BERT, you must configure the duration of the test, the bit pattern to send on the transmit path, and the error rate to monitor when the inbound pattern is received.

To configure the duration of the test, the pattern to send in the bit stream, and the error rate to include in the bit stream, include the **bert-period**, **bert-algorithm**, and **bert-error-rate** statements, respectively, at the **[edit interfaces *interface-name interface-type*-options]** hierarchy level:

```
[edit interfaces interface-name interface-type-options]
bert-algorithm algorithm;
bert-error-rate rate;
bert-period seconds;
```

By default, the BERT period is 10 seconds. You can configure the BERT period to last from 1 through 239 seconds on some PICs and from 1 through 240 seconds on other PICs.

rate is the bit error rate. This can be an integer from 0 through 7, which corresponds to a bit error rate from 10^{-0} (1 error per bit) to 10^{-7} (1 error per 10 million bits).

algorithm is the pattern to send in the bit stream. For a list of supported algorithms, enter a **?** after the **bert-algorithm** statement; for example:

```
[edit interfaces t1-0/0/0 t1-options]

user@host# set bert-algorithm ?
Possible completions:
  pseudo-2e11-o152     Pattern is 2^11 -1 (per O.152 standard)
  pseudo-2e15-o151     Pattern is 2^15 - 1 (per O.152 standard)
  pseudo-2e20-o151     Pattern is 2^20 - 1 (per O.151 standard)
  pseudo-2e20-o153     Pattern is 2^20 - 1 (per O.153 standard)
        ...
```

For specific hierarchy information, see the individual interface types.

NOTE: The 4-port E1 PIC supports only the following algorithms:

```
pseudo-2e11-o152     Pattern is 2^11 -1 (per O.152 standard)
pseudo-2e15-o151     Pattern is 2^15 - 1 (per O.151 standard)
pseudo-2e20-o151     Pattern is 2^20 - 1 (per O.151 standard)
pseudo-2e23-o151     Pattern is 2^23 (per O.151 standard)
```

When you issue the help command from the CLI, all BERT algorithm options are displayed, regardless of the PIC type, and no commit check is available. Unsupported patterns for a PIC type can be viewed in system log messages.

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NOTE: The 12-port T1/E1 Circuit Emulation (CE) PIC supports only the following algorithms:

```
  all-ones-repeating   Repeating one bits
  all-zeros-repeating  Repeating zero bits
  alternating-double-ones-zeros  Alternating pairs of ones and zeros
  alternating-ones-zeros  Alternating ones and zeros
  pseudo-2e11-o152     Pattern is 2^11 -1 (per O.152 standard)
  pseudo-2e15-o151     Pattern is 2^15 - 1 (per O.151 standard)
  pseudo-2e20-o151     Pattern is 2^20 - 1 (per O.151 standard)
  pseudo-2e7           Pattern is 2^7 - 1
  pseudo-2e9-o153      Pattern is 2^9 - 1 (per O.153 standard)
  repeating-1-in-4     1 bit in 4 is set
  repeating-1-in-8     1 bit in 8 is set
  repeating-3-in-24    3 bits in 24 are set
```

When you issue the help command from the CLI, all BERT algorithm options are displayed, regardless of the PIC type, and no commit check is available. Unsupported patterns for a PIC type can be viewed in system log messages.

NOTE: The IQE PICs support only the following algorithms:

```
all-ones-repeating   Repeating one bits
all-zeros-repeating  Repeating zero bits
alternating-double-ones-zeros  Alternating pairs of ones and zeros
alternating-ones-zeros  Alternating ones and zeros
pseudo-2e9-o153      Pattern is 2^9  -1 (per O.153 (511 type) standard)
pseudo-2e11-o152     Pattern is 2^11 -1 (per O.152 and O.153 (2047 type)
 standards)
pseudo-2e15-o151     Pattern is 2^15 -1 (per O.151 standard)
pseudo-2e20-o151     Pattern is 2^20 -1 (per O.151 standard)
pseudo-2e20-o153     Pattern is 2^20 -1 (per O.153 standard)
pseudo-2e23-o151     Pattern is 2^23 -1 (per O.151 standard)
repeating-1-in-4     1 bit in 4 is set
repeating-1-in-8     1 bit in 8 is set
repeating-3-in-24    3 bits in 24 are set
```

When you issue the help command from the CLI, all BERT algorithm options are displayed, regardless of the PIC type, and no commit check is available. Unsupported patterns for a PIC type can be viewed in system log messages.

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NOTE: BERT is supported on the PDH interfaces of the Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP and the DS3/E3 MIC. The following BERT algorithms are supported:

```
all-ones-repeating            Repeating one bits
all-zeros-repeating           Repeating zero bits
alternating-double-ones-zeros Alternating pairs of ones and zeros
alternating-ones-zeros        Alternating ones and zeros
repeating-1-in-4              1 bit in 4 is set
repeating-1-in-8              1 bit in 8 is set
repeating-3-in-24             3 bits in 24 are set
pseudo-2e9-o153               Pattern is 2^9 - 1 (per 0.153 standard)
pseudo-2e11-o152              Pattern is 2^11 - 1 (per 0.152 standard)
pseudo-2e15-o151              Pattern is 2^15 - 1 (per 0.151 standard)
pseudo-2e20-o151              Pattern is 2^20 - 1 (per 0.151 standard)
pseudo-2e20-o153              Pattern is 2^20 - 1 (per 0.153 standard)
pseudo-2e23-o151              Pattern is 2^23 (per 0.151 standard)
```

Table 23 on page 232 shows the BERT capabilities for various interface types.

Table 23: BERT Capabilities by Interface Type

Interface	T1 BERT	T3 BERT	Comments
12-port T1/E1 Circuit Emulation	Yes (ports 0–11)		• Limited algorithms
4-port Channelized OC3/STM1 Circuit Emulation	Yes (port 0–3)		• Limited algorithms
E1 or T1	Yes (port 0–3)	Yes (port 0–3)	• Single port at a time • Limited algorithms
E3 or T3	Yes (port 0–3)	Yes (port 0–3)	• Single port at a time
Channelized OC12	N/A	Yes (channel 0–11)	• Single channel at a time • Limited algorithms • No bit count
Channelized STM1	Yes (channel 0–62)	N/A	• Multiple channels • Only one algorithm • No error insert • No bit count
Channelized T3 and Multichannel T3	Yes (channel 0–27)	Yes (port 0–3 on channel 0)	• Multiple ports and channels • Limited algorithms for T1 • No error insert for T1 • No bit count for T1

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These limitations do not apply to channelized IQ interfaces. For information about BERT capabilities on channelized IQ interfaces, see "Channelized IQ and IQE Interfaces Properties" on page 14.

Starting and Stopping a BERT Test

Before you can start the BERT test, you must disable the interface. To do this, include the **disable** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
disable;
```

After you configure the BERT properties and commit the configuration, begin the test by issuing the **test interface *interface-name interface-type*-bert-start** operational mode command:

```
user@host> test interface interface-name interface-type-bert-start
```

The test runs for the duration you specify with the **bert-period** statement. If you wish to terminate the test sooner, issue the **test interface *interface-name interface-type*-bert-stop** command:

```
user@host> test interface interface-name interface-type-bert-stop
```

For example:

```
user@host> test interface t3-1/2/0 t3-bert-start
user@host> test interface t3-1/2/0 t3-bert-stop
```

To view the results of the BERT test, issue the **show interfaces extensive | find BERT** command:

```
user@host> show interfaces interface-name extensive | find BERT
```

For more information about running and evaluating the results of the BERT procedure, see the CLI Explorer.

NOTE: To exchange BERT patterns between a local router and a remote router, include the **loopback remote** statement in the interface configuration at the remote end of the link. From the local router, issue the **test interface** command.

Example: Configuring Bit Error Rate Testing

Configure a BERT test on a T3 interface. In this example, the run duration lasts for 120 seconds. The configured error rate is 0, which corresponds to a bit error rate of 10^{-0} (1 error per bit). The configured bit pattern of **all-ones-repeating** means that every bit the interface sends is a set to a value of 1.

```
[edit interfaces]
t3-1/2/0 {
  t3-options {
    bert algorithm all-ones-repeating;
    bert-error-rate 0;
```

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```
        bert-period 120;
    }
}
```

Investigating Interface Steps and Commands

This section includes the following information to assist you when troubleshooting ATM interfaces:

- Investigating Interface Steps and Commands Overview on page 234
- Monitoring Interfaces on page 234
- Performing a Loopback Test on an Interface on page 235
- Locating Interface Alarms on page 237

Investigating Interface Steps and Commands Overview

The "Monitoring Interfaces" on page 234 section helps you determine the nature of the interface problem. The "Performing a Loopback Test on an Interface" on page 235 section provides information to help you isolate the source of the problem. The "Locating Interface Alarms" on page 237 section explains some of the alarms and errors for the media.

Monitoring Interfaces

Problem **Description:** The following steps are a general outline of how you monitor interfaces to determine the nature of interface problems. For more detailed information on a specific interface, see the corresponding monitor interfaces section.

Solution To monitor interfaces, follow these steps:

1. Display the status of an interface.
2. Display the status of a specific interface.
3. Display extensive status information for a specific interface.
4. Monitor statistics for an interface.

The Table 24 on page 234 lists and describes the operational mode commands you use to monitor interfaces.

Table 24: Commands Used to Monitor Interfaces

CLI Command	Description
show interfaces terse ***interface-name*** For example: **show interfaces terse t1***	Displays summary information about the named interfaces.
show interfaces ***interface-name*** For example: **show interfaces t1-***x/y/z*	Displays static status information about a specific interface.

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Table 24: Commands Used to Monitor Interfaces *(continued)*

CLI Command	Description
show interfaces *interface-name* **extensive** For example: **show interfaces t1-***x/y/z* **extensive**	Displays very detailed interface information about a specific interface.
monitor interface *interface-name* For example: **monitor interface t1-***x/y/z*	Displays real-time statistics about a physical interface, updated every second.

Performing a Loopback Test on an Interface

Problem **Description:** The following steps are a general outline of how you use loopback testing to isolate the source of the interface problem. For more detailed information on a specific interface, see the corresponding loopback section.

Solution To use loopback testing for interfaces, follow these steps:

1. To diagnose a suspected hardware problem:
   a. Create a loopback.
   b. Set clocking to internal. (Not for Fast Ethernet/Gigabit Ethernet or Multichannel DS3 interfaces.)
   c. Verify that the status of the interface is up.
   d. Configure a static address resolution protocol table entry. (Fast Ethernet/Gigabit Ethernet interfaces only)
   e. Clear the interface statistics.
   f. Force the link layer to stay up.
   g. Verify the status of the logical interface.
   h. Ping the interface.
   i. Check for interface error statistics.
2. To diagnose a suspected connection problem:
   a. Create a loop from the router to the network.
   b. Create a loop to the router from various points in the network.

The Table 25 on page 236 lists and describes the operational and configuration mode commands you use to perform loopback testing on interfaces (the commands are shown in the order in which you perform them).

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Table 25: Commands Used to Perform Loopback Testing on Interfaces

CLI Statement or Command	Interface Type	Description
[edit interfaces *interface-name* interface-options] **set loopback (local | remote)**	All interfaces	The **loopback** statement at the hierarchy level configures a loopback on the interface. Packets can be looped on either the local router or the remote channel service unit (CSU). To turn off loopback, remove the **loopback** statement from the configuration.
show	All interfaces	Verify the configuration before you commit it.
commit	All interfaces	Save the set of changes to the database and cause the changes to take operational effect. Use after you have verified a configuration in all configuration steps.
[edit interfaces *interface-name*] **set clocking internal**	T1, T3, ATM, and SONET interfaces	The **clocking** statement at this hierarchy level configures the clock source of the interface to internal.
show interfaces *interface-name*	Used for all interfaces	Display static status information about a specific interface.
[edit interfaces *interface-name* unit *logical-unit-number* family inet address *ip-address*] **set arp *ip-address mac mac-address***	Fast Ethernet and Gigabit Ethernet interfaces	The **arp** statement at this hierarchy level defines mappings between IP and Media Access Control (MAC) addresses.
show arp no-resolve	Fast Ethernet and Gigabit Ethernet interfaces	Display the entries in the ARP table without attempting to determine the hostname that corresponds to the IP address (the **no-resolve** option).
clear interfaces statistics *interface-name*	All interfaces	Reset the statistics for an interface to zero.
[edit interfaces *interface-name*] **set encapsulation cisco-hdlc**	T1, T3, SONET, and Multichannel DS3 interfaces	The **encapsulation** statement at this hierarchy level sets the encapsulation to the Cisco High-level Data-Link Control (HDLC) transport protocol on the physical interface.
[edit interfaces *interface-name*] **set no-keepalives**	T1, T3, SONET, and Multichannel DS3 interfaces	The **no-keepalives** statement at this level disables the sending of keepalives on the physical interface.
show interfaces *interface-name* terse	T1, T3, and SONET interfaces	Display summary information about interfaces. (Use to display the status of the logical interfaces for these interfaces.)

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Table 25: Commands Used to Perform Loopback Testing on Interfaces *(continued)*

CLI Statement or Command	Interface Type	Description
ping interface t1-*x/y/z local-ip-address* bypass-routing count 1000 rapid	All interfaces	Check the reachability of network hosts by sending **ICMP ECHO_REQUEST** messages to elicit **ICMP ECHO_RESPONSE** messages from the specified host. Use the **bypass-routing** option to ping a local system through an interface that has no route through it. The **count** option sends 1000 ping requests through the system. Type **Ctrl+C** to interrupt a **ping** command.
show interfaces *interface-name* extensive	All interfaces	Display very detailed interface information about a specific interface.

Locating Interface Alarms

Problem **Description:** Locating alarms and errors for the media can be a simple process.

Solution To locate interface alarms and errors, use the **show interfaces *interface-name* extensive** command and examine the output for active alarms and defects.

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CHAPTER 12

Troubleshooting Channelized DS3 Interfaces

- Monitoring Channelized DS3 Interfaces on page 239
- Using Loopback Testing For Channelized DS3 Interfaces on page 252
- Locating Channelized DS3 Alarms and Errors on page 263

Monitoring Channelized DS3 Interfaces

- Checklist for Monitoring Channelized DS3 Interfaces on page 239
- Monitor Channelized DS3 Interfaces on page 240

Checklist for Monitoring Channelized DS3 Interfaces

Purpose To monitor Channelized DS3 interfaces and begin the process of isolating Channelized DS3 interface problems when they occur.

Action Table 26 on page 239 provides the links and commands for monitoring Channelized DS3 interfaces.

Table 26: Checklist for Monitoring Channelized DS3 Interfaces

Tasks	Command or Action
"Monitor Channelized DS3 Interfaces" on page 240	
1. Display the Status of Channelized DS3 Interfaces on page 240	**show interfaces terse t1***
2. Display the Status of a Specific Channelized DS3 Interface on page 241	**show interfaces t1-*fpc/pic/port*:*channel***
3. Display Extensive Status Information for a Specific Channelized DS3 Interface on page 244	**show interfaces t1-*fpc/pic/port*:*channel* extensive**
4. Monitor Statistics for a Channelized DS3 Interface on page 249	**monitor interfaces t1-*fpc/pic/port*:*channel***

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Monitor Channelized DS3 Interfaces

By monitoring Channelized DS3 interfaces, you begin the process of isolating Channelized DS3 interface problems when they occur.

To monitor your Channelized DS3 interfaces, follow these steps:

1. Display the Status of Channelized DS3 Interfaces on page 240
2. Display the Status of a Specific Channelized DS3 Interface on page 241
3. Display Extensive Status Information for a Specific Channelized DS3 Interface on page 244
4. Monitor Statistics for a Channelized DS3 Interface on page 249

Display the Status of Channelized DS3 Interfaces

Purpose To display the status of Channelized DS3 interfaces, use the following Junos OS command-line interface (CLI) operational mode command:

Action user@host> **show interfaces t1* terse**

Sample Output 1

```
user@host> show interfaces t1* terse
Interface               Admin Link Proto Local                 Remote
t1-1/2/0:1              up    down
t1-1/2/0:2              up    down
t1-1/2/0:3              up    down
t1-1/2/0:4              up    down
t1-1/2/0:5              up    up
t1-1/2/0:5.0            up    up   inet  172.16.1.33/30
t1-1/2/0:6              up    up
t1-1/2/0:6.0            up    up   inet  172.16.1.37/30
t1-1/2/0:7              up    up
t1-1/2/0:7.0            up    up   inet  172.16.1.41/30
t1-1/2/0:8              up    down
t1-1/2/0:9              up    down
t1-1/2/0:10             up    down
t1-1/2/0:11             up    up
t1-1/2/0:11.0           up    up   inet  172.16.1.45/30
t1-1/2/0:12             up    up
t1-1/2/0:12.0           up    up   inet  172.16.1.49/30
t1-1/2/0:13             up    up
t1-1/2/0:13.0           up    up   inet  172.16.1.53/30
t1-1/2/0:14             up    up
t1-1/2/0:14.0           up    up   inet  172.16.1.153/30
t1-1/2/0:15             up    up
t1-1/2/0:15.0           up    up   inet  172.16.1.177/30
t1-1/2/0:16             up    up
t1-1/2/0:16.0           up    up   inet  172.16.1.181/30
t1-1/2/0:17             up    up
t1-1/2/0:17.0           up    up   inet  172.16.1.129/30
t1-1/2/0:18             up    up
t1-1/2/0:18.0           up    up   inet  172.16.1.133/30
t1-1/2/0:19             up    down
t1-1/2/0:19.0       up   down inet 172.16.1.137/30
t1-1/2/0:20             up    down
```


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```
t1-1/2/0:21             up    down
t1-1/2/0:22             up    down
t1-1/2/0:23             up    down
t1-1/2/0:24             up    down
t1-1/2/0:25             up    down
t1-1/2/0:26             up    down
t1-1/2/0:27             up    down
t1-1/2/0:28             up    down
```

Sample Output 2

```
user@host> show interfaces t1* terse
Interface               Admin Link Proto Local                 Remote
t1-0/3/3:0       down down
t1-0/3/3:0.0      up  down inet 10.10.10.1/30
t1-0/3/3:1              up    up
t1-0/3/3:1.0            up    up   inet  10.10.10.5/30
t1-0/3/3:2              up    up
t1-0/3/3:2.0            up    up   inet  10.10.10.53/30
```

Meaning The sample output shows the status of both the physical and logical interfaces. Sample output 1 shows that 12 of the possible 28 channels have IP addresses and are connected. Of the 12 connected channels, the last channel (**t1-1/2/0:19.0**) is currently down.

Sample output 2 shows that all links are up except for interface **t1-0/3/3:0**, which has both the physical and logical links down.

Display the Status of a Specific Channelized DS3 Interface

Purpose To display the status of a specific Channelized DS3 interface, use the following Junos OS CLI operational mode command:

Action user@host> **show interfaces t1-*fpc/pic/port*:*channel***

Sample Output 1

```
user@host>  show interfaces t1-1/2/0:5
  Physical interface: t1-1/2/0:5, Enabled, Physical link is Up
    Interface index: 181, SNMP ifIndex: 210
    Description: T1 to Tombstone - Circuit # 123456789
    Link-level type: PPP , MTU: 1504, Clocking: Internal , Speed: T1, Loopback: None,
FCS: 16 , Framing: ESF ,
    Parent: ct3-1/2/0 Interface index 173
    Device flags   : Present Running
    Interface flags: Point-To-Point SNMP-Traps
    Link flags     : Keepalives
    Keepalive settings: Interval 60 seconds, Up-count 1, Down-count 3
    Keepalive: Input: 6898 (00:00:48 ago), Output: 6874 (00:00:07 ago)
    LCP state: Opened
    NCP state: inet: Opened , inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
    CHAP state: Not-configured
    CoS queues     : 4 supported
    Last flapped   : 2004-05-11 16:01:30 EDT (5d 02:41 ago)
    Input rate     : 2648 bps (6 pps)
    Output rate    : 14608 bps (4 pps)
    DS1 alarms : None
```

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```
    DS1  defects  : None

    Logical interface t1-1/2/0:5.0 (Index 86) (SNMP ifIndex 238)
      Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
      Protocol inet, MTU: 1500
        Flags: None
        Addresses, Flags: Is-Preferred Is-Primary
          Destination: 68.71.141.32/30, Local: 68.71.141.33, Broadcast:
68.71.141.35
```

Sample Output 2

```
user@host> show interfaces t1-0/3/3:2
Physical interface: t1-0/3/3:2, Enabled, Physical link is Up
  Interface index: 239, SNMP ifIndex: 127
  Description:
  Link-level type: Cisco-HDLC , MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Mode: M23, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 124789 (00:00:08 ago), Output: 125379 (00:00:04 ago)
  CoS queues     : 4 supported
  Last flapped   : 2004-04-30 09:12:44 UTC (2w0d 10:45 ago)
  Input rate     : 3984 bps (10 pps)
  Output rate    : 56328 bps (14 pps)
  DS1   alarms   : None
  DS3   alarms   : None
  DS1   defects  : None
  DS3   defects  : None
  Logical interface t1-0/3/3:2.0  (Index 132) (SNMP ifIndex 236)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
  Input packets : 33897375
  Output packets: 40673351
    Protocol inet, MTU: 1500
      Flags: No-Redirects, uRPF, uRPF-loose
      Addresses, Flags: Primary Is-Preferred Is-Primary
        Destination: 10.10.10.52/30, Local: 10.10.10.53,
        Broadcast: 10.10.10.55
```

Sample Output 3

```
user@host> show interfaces t1-1/2/0:1
Physical interface: t1-1/2/0:1, Enabled, Physical link is Down
  Interface index: 177, SNMP ifIndex: 205
  Description: T1 to Bedrock #1 - RESERVED
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
 FCS: 16, Framing: ESF,
  Parent: ct3-1/2/0 Interface index 173
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  CoS queues     : 4 supported
  Last flapped   : 2004-04-02 09:12:49 EST (6w2d 08:29 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1  alarms  : AIS, LOF
  DS1  defects : AIS, LOF
```


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Sample Output 4

```
user@host> show interfaces t1-1/2/0:19
  Physical interface: t1-1/2/0:19, Enabled, Physical link is Down
    Interface index: 148, SNMP ifIndex: 224
    Description: T1 to Rock City #6 - Circuit # 987654321
    Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
None, FCS: 16, Framing: ESF,
    Parent: ct3-1/2/0 Interface index 173
    Device flags  : Present Running Down
    Interface flags: Hardware-Down  Point-To-Point SNMP-Traps
    Link flags     : Keepalives
    Keepalive settings: Interval 60 seconds, Up-count 1, Down-count 3
    Keepalive: Input: 0 (never), Output: 0 (never)
    LCP state: Conf-req-sent
    NCP state: inet: Down , inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
    CHAP state: Not-configured
    CoS queues     : 4 supported
    Last flapped   : 2004-05-14 15:56:43 EDT (2d 02:47 ago)
    Input rate     : 0 bps (0 pps)
    Output rate    : 0 bps (0 pps)
    DS1   alarms   : AIS, LOF
    DS1   defects  : AIS, LOF

    Logical interface t1-1/2/0:19.0  (Index 91) (SNMP ifIndex 256)
       Flags: Hardware-Down Device-Down  Point-To-Point SNMP-Traps Encapsulation:
 PPP
      Protocol inet, MTU: 1500
        Flags: Protocol-Down
        Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
          Destination: 68.71.141.136/30, Local: 68.71.141.137, Broadcast:
68.71.141.139
```

Meaning The first line of the output shows the status of the channel. If this line shows that the physical link is up, the physical link is healthy and can pass packets. If this line shows that the physical link is down, the physical link is unhealthy and cannot pass packets.

Sample output 1 shows a channel that is connected and operating correctly. You can verify the following information to check that the interface is functioning correctly:

- Encapsulation used on the physical interface, **Link-level type: PPP**
- Reference clock source, **Clocking: Internal**
- Frame checksum sequence, **FCS: 16**
- Physical layer framing format used on the link, **Framing: ESF**

Because the link-level type is Point-to-Point Protocol (PPP), the link control protocol (LCP) state is **Opened**, and the network control protocol (NCP) state has one protocol, **NCP::inet:Opened**, indicating that the link is healthy. There are no DS1 alarms or defects.

Sample output 2 shows a channel that is connected and operating correctly. However, this channel has Cisco HDLC configured as the link-level type and a logical interface (**t1-0/3/3:2.0)** configured.

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Sample output 3 shows a channel that is not connected, **Physical link is Down**. Loopback is not configured, **Loopback: None**, and the input and output counters are zero. In addition, there are alarm indication signal (AIS) and loss of frame (LOF) alarms and defects.

Sample output 4 shows a channel that is assigned but down, **Physical link is Down**. Information about the physical interfaces shows the device flags are **Present Running Down**, and one of the interface flags is **Hardware-Down**. In addition, interface protocol initialization failed to complete successfully on logical interface **t1-1/2/0:19.0**, **Flags: Hardware-Down Device-Down**.

Display Extensive Status Information for a Specific Channelized DS3 Interface

Purpose To display the status of Channelized DS3 interfaces, use the following Junos OS CLI operational mode command:

Action user@host> **show interfaces t1-*fpc/pic/port*:*channel* extensive**

Sample Output 1

```
user@host> show interfaces t1-1/2/0:5 extensive
Physical interface: t1-1/2/0:5, Enabled, Physical link is Up
  Interface index: 181, SNMP ifIndex: 210, Generation: 96
  Description: T1 to Tombstone - Circuit # 123456789
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
 FCS: 16, Framing: ESF,
  Parent: ct3-1/2/0 Interface index 173
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 60 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 6910 (last seen 00:00:21 ago)
    Output: 6886 (last sent 00:00:04 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
  CHAP state: Not-configured
  CoS queues     : 4 supported
  Last flapped   : 2004-05-11 16:01:30 EDT (5d 02:53 ago)
  Statistics last cleared: 2004-05-11 23:43:42 EDT (4d 19:10 ago)
  Traffic statistics:
   Input  bytes  :            551301316                 4432 bps
   Output bytes  :           4091306894                 2696 bps
   Input  packets:              5231609                    6 pps
   Output packets:              4867661                    3 pps
  Input errors:
    Errors: 47, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
 398, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort              4820512              4804578                24909

    1 expedited-fo                   0                    0                    0
```


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```
    2 assured-forw                 0                 0                 0

    3 network-cont             63083             63083                 0

  DS1 alarms : None
  DS1 defects : None
  T1 media:              Seconds        Count  State
    SEF          5     4 OK
    BEE        246     127 OK
    AIS                       0             0  OK
    LOF                       0             0  OK
    LOS                       0             0  OK
    YELLOW                    0             0  OK
    BPV                       0             0
    EXZ                       0             0
    LCV                     246           538
    PCV                       0             0
    CS                        0             0
    LES                       0
    ES                        0
    SES                       8
    SEFS                     12
    BES                       0
    UAS                       0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 1514, Runt threshold: 0
    Timeslots      : All active
    Line encoding: B8ZS, Byte encoding: Nx64K
    Buildout       : 0 to 132 feet
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 1, PLP byte: 4 (0x01)
  Logical interface t1-1/2/0:5.0 (Index 86) (SNMP ifIndex 238) (Generation 111)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 117, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
       Destination: 68.71.141.32/30, Local: 68.71.141.33, Broadcast: 68.71.141.35,
 Generation: 169
Even though there are counts in the t1 media section of the output, notice how
the “ State”  column has all “ OK”
```

Sample Output 2

```
user@host> show interfaces t1-0/3/3:2 extensive
Physical interface: t1-0/3/3:2, Enabled, Physical link is Up
  Interface index: 239, SNMP ifIndex: 127, Generation: 122
  Description:
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Mode: M23, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
```

```
  Input : 124790 (last seen 00:00:03 ago)
  Output: 125379 (last sent 00:00:09 ago)
CoS queues      : 4 supported
Last flapped    : 2004-04-30 09:12:44 UTC (2w0d 10:45 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :           2930724407                 9560 bps
 Output bytes  :           9983871242                78464 bps
 Input  packets:             17011460                   14 pps
 Output packets:             20390813                   19 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 233516,
  L3 incompletes: 1, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 17341, Aged packets: 0
DS1 alarms : None
DS3 alarms : None
DS1 defects : None
DS3 defects : None
 T1 media:              Seconds        Count  State
  SEF                         0            0  OK
  BEE          1      1 OK
  AIS                         0            0  OK
  LOF                         0            0  OK
  LOS                         0            0  OK
  YELLOW                      7            1  OK
  BPV                         0            0
  EXZ                         0            0
  LCV                         1         1029
  PCV                         0            0
  CS                          0            0
  LES                         0
  ES                          0
  SES                         1
  SEFS                        2
  BES                         0
  UAS                         0
DS3 media:             Seconds        Count  State
  PLL Lock                    0            0  OK
  Reframing                   0            0  OK
  AIS                         0            0  OK
  LOF                         0            0  OK
  LOS                         0            0  OK
  IDLE                        0            0  OK
  YELLOW                      7            1  OK
  BPV                         1        65535
  EXZ                         1        65535
  LCV                         2       131070
  PCV                         1         1079
  LES                         1
  PES                         1
  PSES                        1
  SEFS                        0
  UAS                         0
Interface transmit queues:
            B/W  WRR       Packets        Bytes        Drops       Errors
  Queue0     95   95      20265434   9981112904        17341            0
  Queue1      5    5        125379      2758338            0            0
HDLC configuration:
  Giant threshold: 1514, Runt threshold: 3
```


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```
    Timeslots      : 1-24
    Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled,
    Idle cycle flag: flags, Start end flag: shared
  DS-3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 2 (0x2e)
    CoS transmit queue             Bandwidth           Buffer Priority   Limit
                              %          bps   %        bytes
    0 best-effort            95      1459200  95            0      low    none
    3 network-control         5        76800   5            0      low    none
  Logical interface t1-0/3/3:2.0 (Index 132) (SNMP ifIndex 236) (Generation 69)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Traffic statistics:
     Input  bytes  :           5789719245
     Output bytes  :          19909405752
     Input  packets:             33897585
     Output packets:             40673646
    Local statistics:
     Input  bytes  :           2930724407
     Output bytes  :           9983871242
     Input  packets:             17011460
     Output packets:             20390813
    Transit statistics:
     Input  bytes  :           2858994838                14784 bps
     Output bytes  :           9925534510               286584 bps
     Input  packets:             16886125                   25 pps
     Output packets:             20282833                   38 pps
    Protocol inet, MTU: 1500, Generation: 80, Route table: 0
      Flags: No-Redirects, uRPF, uRPF-loose
      RPF Failures: Packets: 0, Bytes: 0
      Addresses, Flags: Primary Is-Preferred Is-Primary
        Destination: 10.10.10.52/30, Local: 10.10.10.53,
        Broadcast: 10.10.10.55, Generation: 159
```

Sample Output 3

```
user@host> show interfaces t1-1/2/0:19 extensive
Physical interface: t1-1/2/0:19, Enabled, Physical link is Down
  Interface index: 148, SNMP ifIndex: 224, Generation: 110
  Description: T1 to Rock City - Circuit # 987654321
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
 FCS: 16, Framing: ESF,
  Parent: ct3-1/2/0 Interface index 173
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 60 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Conf-req-sent
  NCP state: inet: Down, inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
  CHAP state: Not-configured
  CoS queues     : 4 supported
```

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```
  Last flapped   : 2004-05-14 15:56:43 EDT (2d 03:01 ago)
  Statistics last cleared: 2004-04-09 13:30:02 EDT (5w2d 05:28 ago)
  Traffic statistics:
   Input  bytes  :                89198                    0 bps
   Output bytes  :                90532                    0 bps
   Input  packets:                 6371                    0 pps
   Output packets:                 6448                    0 pps
  Input errors:
    Errors: 271124, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed
discards: 266254, L3 incompletes: 0,
    L2 channel errors: 2, L2 mismatch timeouts: 2, HS link CRC errors: 0, SRAM
errors: 0
  Output errors:
    Carrier transitions: 32, Errors: 0, Drops: 0, Aged packets: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                    0                    0

    1 expedited-fo                  0                    0                    0

    2 assured-forw                  0                    0                    0

    3 network-cont               6448                 6448                    0

  DS1 alarms : AIS, LOF
  DS1 defects : AIS, LOF
  T1 media:             Seconds        Count  State
    SEF                       33           31  OK
    BEE                       53           47  OK
    AIS        3201537     15 Defect Active
    LOF        3202041     16 Defect Active
    LOS                        0            0  OK
    YELLOW               1023435            0  OK
    BPV                        0            0
    EXZ                        0            0
    LCV                       53           72
    PCV                        0            0
    CS                         0            0
    LES                  3202041
    ES                   3202041
    SES                  3202060
    SEFS                 3202102
    BES                        0
    UAS                  3202160
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 1514, Runt threshold: 0
    Timeslots      : All active
    Line encoding: B8ZS, Byte encoding: Nx64K
    Buildout       : 0 to 132 feet
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 1, PLP byte: 4 (0x04)
  Logical interface t1-1/2/0:19.0 (Index 91) (SNMP ifIndex 256) (Generation 115)

    Flags: Hardware-Down Device-Down Point-To-Point SNMP-Traps Encapsulation: PPP
```


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```
    Protocol inet, MTU: 1500, Generation: 121, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 68.71.141.136/30, Local: 68.71.141.137, Broadcast:
68.71.141.139, Generation: 179
```

Meaning The sample output shows very detailed interface information which includes where any errors might be occurring. The first line of the output indicates if the link is up. Sample output 1 and 2 show that both links are up. Sample output 3 shows that the link is down. The main sections of the output to examine are:

- DS1 alarms
- DS1 defects
- T1 media

Both sample output 1 and 2 show no DS1 alarms or defects. Sample output 3 shows AIS and LOF alarms and defects. For more information about AIS and LOF alarms and defects, see *List of Common SONET Alarms and Errors*.

Even though there are counts in the T1 media section of the output in sample output 1 and 2, the **State** column indicates that the media are **OK**. However, sample output 3, in which the link is down, shows that the AIS and LOF defects are active.

Monitor Statistics for a Channelized DS3 Interface

Purpose To display the status of Channelized DS3 interfaces, use the following Junos OS CLI operational mode command:

Action user@host> **monitor interfaces t1-*fpc/pic/port*:*channel***

Sample Output

```
user@host> monitor interfaces t1-1/2/0:5
host     Seconds: 35                  Time: 19:02:34
                                                                Delay: 0/0/27
Interface: t1-1/2/0:5, Enabled, Link is Up
Encapsulation: PPP, Keepalives, Speed: T1
Traffic statistics:                                             Current delta
  Input bytes:                 551635800 (1768 bps)                 [16596]
  Output bytes:               4094623791 (71376 bps)                [64020]
  Input packets:                 5234195 (2 pps)                      [211]
  Output packets:                4872090 (8 pps)                      [147]
Encapsulation statistics:
  Input keepalives:                 6918                              [1]
  Output keepalives:                6893                              [0]
  LCP state: Opened
Error statistics:
  Input errors:                       47                              [0]
  Input drops:                         0                              [0]
  Input framing errors:                0                              [0]
  Policed discards:                  398                              [0]
  L3 incompletes:                      0                              [0]
  L2 channel errors:                   0                              [0]
  L2 mismatch timeouts:                0                              [0]
  Carrier transitions:                 0                              [0]
```

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```
  Output errors:                          0                                [0]
  Output drops:                           0                                [0]
  Aged packets:                           0                                [0]
Active alarms : None
Active defects: None
T1 statistics:
  BPV                                     0                                [0]
  EXZ                                     0                                [0]
  LCV                                   538                                [0]
  PCV                                     0                                [0]
  CS                                      0                                [0]
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'
```

Sample Output 2

```
user@host> monitor interface t1-0/3/3:2
 host    Seconds: 9      Time: 10:36:11
 Delay: 3/3/3
Interface: t1-0/3/3:2, Enabled, Link is Up
Encapsulation: Cisco-HDLC, Keepalives, Speed: T1
Traffic statistics:                                              Current delta
  Input bytes:                 2931288250 (43936 bps)
[427]
  Output bytes:                9987968300 (93512 bps)
[207]
  Input packets:                 17017904 (106 pps)
[14]
  Output packets:                20398890 (109 pps)
[26]
Encapsulation statistics:
  Input keepalives:                124817
[0]
  Output keepalives:               125405
[0]
Error statistics:
  Input errors:                             0
    [0]
  Input drops:                             0
   [0]
  Input framing errors:                 0
[0]
  Input runts:                             0          [0]
  Input giants:                     0    [0]
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'
```

Sample Output 3

```
user@host> monitor t1-1/2/0:19
host      Seconds: 9                  Time: 19:05:23
                                                                 Delay: 0/0/68
Interface: t1-1/2/0:19, Enabled, Link is Down
Encapsulation: PPP, Keepalives, Speed: T1
Traffic statistics:                                              Current delta
  Input bytes:                      89198 (0 bps)                        [0]
  Output bytes:                     90532 (0 bps)                        [0]
  Input packets:          6371 (0 pps)          [0]
  Output packets:          6448 (0 pps)          [0]
Encapsulation statistics:
  Input keepalives:                     0                                [0]
  Output keepalives:                    0                                [0]
```


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```
  LCP state: Conf-req-sent
Error statistics:
  Input errors:                    271124                          [0]
  Input drops:                          0                          [0]
  Input framing errors:                 0                          [0]
  Policed discards:                266254                          [0]
  L3 incompletes:                       0                          [0]
  L2 channel errors:                    2                          [0]
  L2 mismatch timeouts:                 2                          [0]
  Carrier transitions:                 32                          [0]
  Output errors:                        0                          [0]
  Output drops:                         0                          [0]
  Aged packets:                         0                          [0]
Active alarms : AIS LOF
Active defects: AIS LOF
T1 statistics:
  BPV                                   0                          [0]
  EXZ                                   0                          [0]
  LCV                                  72                          [0]
  PCV                                   0                          [0]
  CS                                    0                          [0]
Interface warnings:
  o Outstanding DS1 alarm(s)
  o INET NCP is not Opened
  o LCP state is not Opened
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'
```

Meaning The sample output shows common interface failures, indicates whether loopback is detected, and shows increases in framing errors. Use information from this command to help narrow down possible causes of an interface problem.

The output in the examples is static, however, the counters in real time change as they are updated every second. The counters in sample output 3 show that there is no traffic for the interface that is down, and that it has active alarms, defects, and there are interface warnings.

NOTE: If you are accessing the router from the console connection, make sure you set the CLI terminal type using the **set cli terminal** command.

CAUTION: We recommend that you use this command only for diagnostic purposes. Do not leave it on during normal router operations because real-time monitoring of traffic consumes additional CPU and memory resources.

Related Documentation

Using Loopback Testing For Channelized DS3 Interfaces

- Checklist for Using Loopback Testing for Channelized DS3 Interfaces on page 252
- Diagnose a Suspected Hardware Problem with a Channelized DS3 Interface on page 253
- Create a Loopback on page 253
- Verify That the Interface Is Up on page 255
- Clear Interface Statistics on page 256
- Force the Link Layer to Stay Up on page 256
- Verify the Status of the Logical Interface on page 258
- Ping the Channelized Interface on page 259
- Check for Interface Error Statistics on page 259
- Diagnose a Suspected Circuit Problem on page 261

Checklist for Using Loopback Testing for Channelized DS3 Interfaces

Purpose To use loopback testing to isolate Channelized DS3 interface problems.

Action Table 27 on page 252 provides the links and commands for using loopback testing for Channelized DS3 interfaces.

Table 27: Checklist for Using Loopback Testing for Channelized DS3 Interfaces

Tasks	Command or Action
"Diagnose a Suspected Hardware Problem with a Channelized DS3 Interface" on page 253	
1. Create a Loopback on page 253	
a. Create a Physical Loopback on page 254	Connect the TX port to the RX port.
b. Configure a Local Loopback on page 254	**[edit interfaces *interface name* (t3-options | t1-options)]** **set loopback local** **show** **commit**
2. Verify That the Interface Is Up on page 255	**show interfaces t1-*fpc/pic/port:channel*** **show interfaces t3-*fpc/pic/port:channel***
3. Clear Interface Statistics on page 256	**clear interfaces statistics t1-*fpc/pic/port:channel***
4. Force the Link Layer to Stay Up on page 256	
a. Configure Encapsulation to Cisco-HDLC on page 256	**[edit interfaces *interface-name*]** **set encapsulation cisco-hdlc** **show** **commit**

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Table 27: Checklist for Using Loopback Testing for Channelized DS3 Interfaces *(continued)*

Tasks	Command or Action
b. Configure No-Keepalives on page 258	[edit interfaces *interface-name*] set no-keepalives show commit
5. Verify the Status of the Logical Interface on page 258	show interfaces t1-*fpc/pic/port:channel*
6. Ping the Channelized Interface on page 259	ping interface t1-*fpc/pic/port:channel local-IP-address* bypass-routing count 1000 rapid
7. Check for Interface Error Statistics on page 259	show interfaces t1-*fpc/pic/port:channel* extensive
"Diagnose a Suspected Circuit Problem" on page 261	
8. "Create a Loop from the Router to the Network" on page 262	[edit interfaces t1-*fpc/pic/port:channel* t1-options] set loopback remote show commit
9. Create a Loop to the Router from Various Points in the Network on page 262	Perform Steps 2 through 8 from "Diagnose a Suspected Hardware Problem with a Channelized DS3 Interface" on page 253.

Diagnose a Suspected Hardware Problem with a Channelized DS3 Interface

Problem **Description:** To diagnose a suspected hardware problem with a Channelized DS3 interface, follow these steps:

Solution

- Create a Loopback on page 253
- Verify That the Interface Is Up on page 255
- Clear Interface Statistics on page 256
- Force the Link Layer to Stay Up on page 256
- Verify the Status of the Logical Interface on page 258
- Ping the Channelized Interface on page 259
- Check for Interface Error Statistics on page 259

Create a Loopback

You can create a physical loopback or configure a local loopback to help diagnose a suspected hardware problem. Creating a physical loopback is recommended because it allows you to test and verify the Channelized DS3 port. If a field engineer is not available

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to create the physical loopback, you can configure a local loopback for the interface. The local loopback creates a loopback internally in the Physical Interface Card (PIC).

1. Create a Physical Loopback on page 254
2. Configure a Local Loopback on page 254

Create a Physical Loopback

Action

To create a physical loopback at the port, connect the transmit port to the receive port.

Meaning

When you create and test a physical loopback, you are testing the transmit and receive ports of the PIC. This action is recommended if a field engineer is available to create the physical loop as it provides a more complete test of the PIC.

Configure a Local Loopback

Action

To configure a local loopback, follow these steps:

1. In configuration mode, go to the following hierarchy level, depending on whether you are configuring a full T3 or T1 interface:

   ```
   [edit]
   user@host# edit interfaces interface-name (t3-options | t1-options)
   ```

2. Configure the local loopback:

   ```
   [edit interfaces interface-name (t3-options | t1-options]
   user@host# set loopback local
   ```

   The following is an example of the name for a T1 channel on a Channelized DS3 port for a Channelized DS3 to DS1 interface:

   ```
   [edit interfaces t1-2/1/1:0 t1-options]
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t1-2/1/1:0 t1-options]
   user@host# show
   loopback local;
   ```

4. Commit the configuration:

   ```
   user@host# commit
   ```

   For example:

   ```
   [edit interfaces t1-2/1/1:0 t1-options]
   user@host# commit
   commit complete
   ```


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Meaning

When you create a local loopback, you create an internal loop on the interface being tested. A local loopback loops the traffic internally on that PIC. A local loopback tests the interconnection of the PIC but does not test the transmit and receive ports.

NOTE: **Remember to delete the loopback statement after completing the test.**

Verify That the Interface Is Up

Purpose Display the status of a Channelized DS1 or DS3 interface to determine whether the physical link is up or down.

Action To verify that the status of the Channelized DS1 or DS3 interface is up, use one of the following Junos OS command-line interface (CLI) operational mode commands:

```
user@host> show interfaces t1-fpc/pic/port:channel
user@host> show interfaces t3-fpc/pic/port:channel
```

Sample Output

The following sample output is for a channelized DS3 to DS1 interface:

```
user@host#  show interfaces t1-2/1/0:20
Physical interface: t1-2/1/0:20, Enabled, Physical link is Up
  Interface index: 210, SNMP ifIndex: 173
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
 Local, FCS: 16,
  Mode: C/Bit parity, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 39 (00:00:06 ago), Output: 0 (never)
  CoS queues     : 4 supported
  Last flapped   : 2004-05-20 21:46:27 UTC (00:14:28 ago)
  Input rate     : 16 bps (0 pps)
  Output rate    : 160 bps (0 pps)
  DS1   alarms   : None
  DS3   alarms   : None
  DS1   defects  : None
  DS3   defects  : None
  Logical interface t1-2/1/0:20.0 (Index 74) (SNMP ifIndex 213)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.10.1.1, Local: 10.10.1.2
```

Meaning The sample output shows that the physical link is up and there are no DS1 or DS3 alarms or defects. You should not see any DS1 or DS3 alarms. You can check any interface on the Channelized DS3 port. See "“Checklist for Channelized DS3 Alarms and Errors” on page 263" for more information on Channelized DS3 alarms and errors.

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Clear Interface Statistics

Purpose

You must reset the Channelized DS3 interface statistics before initiating the ping test. Resetting the statistics provides a clean start so that previous input/output errors and packet statistics do not interfere with the current efforts to diagnose the problem.

Action

To clear all statistics for the interface, use the following Junos OS CLI operational mode command:

user@host> **clear interfaces statistics t1-*fpc/pic/port:channel***

Sample Output

```
user@host>  clear interfaces statistics t1-2/1/0:20
user@host>
```

Meaning

This command clears the interface statistics counters for the Channelized or T1 interface only.

NOTE: After a Graceful Routing Engine switchover (GRES) you must run **clear interface statistics** again or interface statistics will display junk vales.

Force the Link Layer to Stay Up

Purpose

To complete the loopback test, the link layer must remain up. However, Junos OS is designed to recognize that loop connections are not valid connections and to bring the link layer down. If you have the Point-to-Point protocol (PPP) configured, you need to change the encapsulation to Cisco High-Level Data Link Control (HDLC) and reconfigure the keepalives in order to force the link layer to stay up.

Force the link layer to stay up, follow these steps:

1. Configure Encapsulation to Cisco-HDLC on page 256
2. Configure No-Keepalives on page 258

Configure Encapsulation to Cisco-HDLC

Action

To set the encapsulation on a T1 physical interface, follow these steps:

1. In configuration mode, go to the following hierarchy level:

   ```
   [edit]
   user@host#  edit interfaces interface-name
   ```


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2. Configure Cisco-HDLC:

   ```
   [edit interfaces interface-name]
   user@host# set encapsulation cisco-hdlc
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t1-0/1/1:8]
   user@host# show
   encapsulation hdlc;
   ```

4. Commit the change:

   ```
   user@host# commit
   ```

   For example:

   ```
   [edit interfaces t1-0/1/1:8]
   user@host# commit
   commit complete
   ```

5. Check the interface configuration

   ```
   user@host# run show interfaces t1-2/1/0:20
   Physical interface: t1-2/1/0:20, Enabled, Physical link is Up
   Interface index: 210, SNMP ifIndex: 173
   Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1,   Loopback:
    Local, FCS: 16,
   Mode: C/Bit parity, Framing: ESF
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps
   Link flags     : Keepalives
   Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
   Keepalive: Input: 39 (00:00:06 ago), Output: 0 (never)
   CoS queues     : 4 supported
   Last flapped   : 2004-05-20 21:46:27 UTC (00:14:28 ago)
   Input rate     : 16 bps (0 pps)
   Output rate    : 160 bps (0 pps)
   DS1   alarms   : None
   DS3   alarms   : None
   DS1   defects  : None
   DS3   defects  : None
   Logical interface t1-2/1/0:20.0 (Index 74) (SNMP ifIndex 213)
   Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
   Protocol inet, MTU: 1500
   Flags: None
   Addresses, Flags: Is-Preferred Is-Primary
   Destination: 10.10.1.1, Local: 10.10.1.2
   ```

Meaning

This command sets the interface encapsulation to the Cisco HDLC transport protocol. You must configure the interface with Cisco HDLC to ensure that the logical interface remains up in preparation for the ping test.

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Configure No-Keepalives

Action

To disable the sending of link-layer keepalives on a channelized DS3 interface, follow these steps:

1. In configuration mode, go to the following hierarchy level:

   ```
   [edit]
   user@host#  edit interfaces interface-name
   ```

2. Configure no-keepalives:

   ```
   [edit interfaces interface-name]
   user@host#  set no-keepalives
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t1-2/1/0:20]
   user@host# show
   no-keepalives;
   ```

4. Commit the change:

   ```
   user@host# commit
   ```

   For example:

   ```
   [edit interfaces t1-2/1/0:20]
   user@host# commit
   commit complete
   ```

Meaning

By setting no-keepalives, the link layer is forced to stay up. If the setting remains at keepalive, the router will recognize that the same link-layer keepalives are being looped back and will bring the link layer down.

Verify the Status of the Logical Interface

Purpose To verify the status of the logical interface, use the following Junos OS CLI operational mode command:

Action user@host> **show interfaces t1-*fpc/pic/port*:*channel***

Sample Output 1

```
user@host#  show interfaces t1-2/1/0:20
Physical interface: t1-2/1/0:20, Enabled, Physical link is Up
  Interface index: 210, SNMP ifIndex: 173
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
 Local, FCS: 16,
  Mode: C/Bit parity, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
```


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```
Link flags     : Keepalives
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive: Input: 39 (00:00:06 ago), Output: 0 (never)
CoS queues     : 4 supported
Last flapped   : 2004-05-20 21:46:27 UTC (00:14:28 ago)
Input rate     : 16 bps (0 pps)
Output rate    : 160 bps (0 pps)
DS1   alarms   : None
DS3   alarms   : None
DS1   defects  : None
DS3   defects  : None
Logical interface t1-2/1/0:20.0 (Index 74) (SNMP ifIndex 213)
  Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
  Protocol inet, MTU: 1500
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 10.10.1.1, Local: 10.10.1.2
```

Meaning The sample output shows that the channelized interface has the physical and logical links up.

Ping the Channelized Interface

Purpose Use the ping command to verify the loopback connection.

Action To ping the local interface, use the following Junos OS CLI operational mode commands:

user@host> **ping interface t1-*fpc/pic/port:channel local-IP-address* bypass-routing count 1000 rapid**

Sample Output

```
user@host> ping interface t1-2/1/0:20 10.10.1.2 bypass-routing count 1000 rapid
PING 10.10.1.2 (10.10.1.2): 56 data bytes
!!!
```

Action To check the local interface for error statistics, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces t1-fpc/pic/port:channel extensive
```

Sample Output

```
user@host# show interfaces t1-2/1/0:20 extensive
Physical interface: t1-2/1/0:20, Enabled, Physical link is Up
  Interface index: 210, SNMP ifIndex: 173, Generation: 93
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
 Local, FCS: 16,
  Mode: C/Bit parity, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : No-Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2004-05-20 21:46:27 UTC (00:26:47 ago)
  Statistics last cleared: 2004-05-20 22:12:03 UTC (00:01:11 ago)
  Traffic statistics:
   Input  bytes  :                88680                27640 bps
   Output bytes  :                88680                27640 bps
   Input  packets:                 1010                   39 pps
   Output packets:                 1010                   39 pps
   Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0, L3 incompletes:
 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
   Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  DS1 alarms : None
  DS3 alarms : None
  DS1 defects : None
  DS3 defects : None
  T1  media:            Seconds        Count  State
    SEF                       0            0  OK
    BEE                       0            0  OK
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CS                        0            0
    LES                       0
    ES                        0
    SES                       0
    SEFS                      0
    BES                       0
    UAS                       0
  DS3 media:            Seconds        Count  State
    PLL Lock                  0            0  OK
    Reframing                 0            0  OK
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
```


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```
    BPV                         0           0
    EXZ                         0           0
    LCV                         0           0
    PCV                         0           0
    CCV                         0           0
    LES                         0
    PES                         0
    PSES                        0
    CES                         0
    CSES                        0
    SEFS                        0
    UAS                         0
  Interface transmit queues:
              B/W  WRR       Packets        Bytes        Drops       Errors
    Queue0     95   95             0            0            0            0
    Queue1      5    5          1010        88680            0            0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 3
    Timeslots      : All active
    Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled, Idle
cycle flag: flags,
    Start end flag: shared
  DS-3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 2, PLP byte: 2 (0x14)
    CoS transmit queue             Bandwidth           Buffer Priority   Limit
                              %          bps   %        bytes
    0 best-effort            95      1459200  95            0      low    none
    3 network-control         5        76800   5            0      low    none
  Logical interface t1-2/1/0:20.0 (Index 74) (SNMP ifIndex 213) (Generation 14)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Generation: 24, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.10.1.1, Local: 10.10.1.2, Broadcast: Unspecified,
Generation: 24
```

Meaning Check for any error statistics that may appear in the output. There should not be any input or output errors. If there are any persistent input or output errors, open a case with JTAC at **support@juniper.net**, or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

Diagnose a Suspected Circuit Problem

Purpose

When you suspect a circuit problem, it is important to work with the transport-layer engineer to resolve the problem. The transport-layer engineer may ask you to create a loop from the router to the network, or the engineer may create a loop to the router from various points in the network.

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To diagnose a suspected circuit problem, follow these steps:

1. Create a Loop from the Router to the Network on page 262
2. Create a Loop to the Router from Various Points in the Network on page 262

Create a Loop from the Router to the Network

Purpose

Creating a loop from a particular T1 interface to the network allows the transport-layer engineer to test the T1 interface from various points in the network and isolate the problem.

Action

To create a loop from a particular T1 interface to the network, follow these steps:

1. In configuration mode, go to the following hierarchy level:

   ```
   [edit]
   user@host# edit interfaces t1-fpc/pic/port:channel t1-options
   ```

2. Configure the loopback:

   ```
   [edit interfaces interface-name  t1-options]
   user@host#  set loopback remote
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t1-2/1/1:0:0 t1-options]
   user@host# show
   loopback remote;
   ```

4. Commit the configuration:

   ```
   user@host# commit
   ```

Meaning

This command loops any traffic from the network back into the network.

Create a Loop to the Router from Various Points in the Network

Purpose

The transport-layer engineer creates a loop to the router from various points in the network. You can then perform tests to verify the connection from the router to that loopback in the network.

Action

After the transport-layer engineer has created the loop to the router from the network, you must verify the connection from the router to the loopback in the network. Follow Steps 2 through 7 in "Diagnose a Suspected Hardware Problem with a Channelized DS3

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Interface" on page 253. Keep in mind that any problems encountered in the test indicate a problem with the connection from the router to the loopback in the network.

By performing tests to loopbacks at various points in the network, you can isolate the source of the problem.

Related Documentation

Locating Channelized DS3 Alarms and Errors

- Checklist for Channelized DS3 Alarms and Errors on page 263
- Display Alarms and Errors for Channelized DS3 Interfaces on page 263

Checklist for Channelized DS3 Alarms and Errors

Purpose To check the most common Channelized DS3 alarms and errors when investigating line problems on a Juniper Networks router.

Action Table 28 on page 263 provides links and commands for Channelized DS3 alarms and errors.

Table 28: Checklist for Channelized DS3 Alarms and Errors

Tasks	Command or Action
"Display Alarms and Errors for Channelized DS3 Interfaces" on page 263	**show interfaces t1-*fpc/pic/port:channel* extensive**

Display Alarms and Errors for Channelized DS3 Interfaces

Purpose To display channelized DS3 alarms and errors, use the following Junos OS command-line interface (CLI) operational mode command:

Action user@host> **show interfaces t1-*fpc/pic/port:channel* extensive**

Sample Output 1

```
user@host> show interfaces t1-1/2/0:5 extensive
Physical interface: t1-1/2/0:5, Enabled, Physical link is Up
  Interface index: 181, SNMP ifIndex: 210, Generation: 96
  Description: T1 to Tombstone - Circuit # 123456789
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
 FCS: 16, Framing: ESF,
  Parent: ct3-1/2/0 Interface index 173
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 60 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 6910 (last seen 00:00:21 ago)
    Output: 6886 (last sent 00:00:04 ago)
  LCP state: Opened
```

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```
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
  CHAP state: Not-configured
  CoS queues      : 4 supported
  Last flapped    : 2004-05-11 16:01:30 EDT (5d 02:53 ago)
  Statistics last cleared: 2004-05-11 23:43:42 EDT (4d 19:10 ago)
  Traffic statistics:
   Input  bytes  :            551301316                 4432 bps
   Output bytes  :           4091306894                 2696 bps
   Input  packets:              5231609                    6 pps
   Output packets:              4867661                    3 pps
  Input errors:
    Errors: 47, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
 398, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort              4820512              4804578                24909

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont               63083                63083                    0

  DS1 alarms : None
  DS1 defects : None
   T1 media:              Seconds        Count  State
    SEF          5      4 OK
   BEE         246     127 OK
    AIS          0      0 OK
    LOF          0      0 OK
    LOS          0      0 OK
    YELLOW       0      0 OK
    BPV                        0            0
    EXZ                        0            0
    LCV                      246          538
    PCV                        0            0
    CS                         0            0
    LES                        0
    ES                         0
    SES                        8
    SEFS                      12
    BES                        0
    UAS                        0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 1514, Runt threshold: 0
    Timeslots      : All active
    Line encoding: B8ZS, Byte encoding: Nx64K
    Buildout       : 0 to 132 feet
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 1, PLP byte: 4 (0x01)
  Logical interface t1-1/2/0:5.0 (Index 86) (SNMP ifIndex 238) (Generation 111)
```


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```
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 117, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
       Destination: 68.71.141.32/30, Local: 68.71.141.33, Broadcast: 68.71.141.35,
 Generation: 169
```

Sample Output 2

```
user@host> show interfaces t1-1/2/0:19 extensive
Physical interface: t1-1/2/0:19, Enabled, Physical link is Down
  Interface index: 148, SNMP ifIndex: 224, Generation: 110
  Description: T1 to Rock City - Circuit # 987654321
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
 FCS: 16, Framing: ESF,
  Parent: ct3-1/2/0 Interface index 173
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 60 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Conf-req-sent
  NCP state: inet: Down, inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
  CHAP state: Not-configured
  CoS queues     : 4 supported
  Last flapped   : 2004-05-14 15:56:43 EDT (2d 03:01 ago)
  Statistics last cleared: 2004-04-09 13:30:02 EDT (5w2d 05:28 ago)
  Traffic statistics:
   Input  bytes  :                89198                    0 bps
   Output bytes  :                90532                    0 bps
   Input  packets:                 6371                    0 pps
   Output packets:                 6448                    0 pps
  Input errors:
    Errors: 271124, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed
discards: 266254, L3 incompletes: 0,
    L2 channel errors: 2, L2 mismatch timeouts: 2, HS link CRC errors: 0, SRAM
errors: 0
  Output errors:
    Carrier transitions: 32, Errors: 0, Drops: 0, Aged packets: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                    0                    0

    1 expedited-fo                  0                    0                    0

    2 assured-forw                  0                    0                    0

    3 network-cont               6448                 6448                    0

 DS1 alarms : AIS, LOF
 DS1 defects : AIS, LOF
   T1 media:              Seconds        Count  State
    SEF                        33           31  OK
    BEE                        53           47  OK
    AIS         3201537        15 Defect Active
    LOF         3202041        16 Defect Active
    LOS                         0            0  OK
```

```
    YELLOW              1023435            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                      53           72
    PCV                       0            0
    CS                        0            0
    LES                 3202041
    ES                  3202041
    SES                 3202060
    SEFS                3202102
    BES                       0
    UAS                 3202160
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 1514, Runt threshold: 0
    Timeslots      : All active
    Line encoding: B8ZS, Byte encoding: Nx64K
    Buildout       : 0 to 132 feet
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 1, PLP byte: 4 (0x04)
  Logical interface t1-1/2/0:19.0 (Index 91) (SNMP ifIndex 256) (Generation 115)

    Flags: Hardware-Down Device-Down  Point-To-Point SNMP-Traps Encapsulation: PPP

    Protocol inet, MTU: 1500, Generation: 121, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 68.71.141.136/30, Local: 68.71.141.137, Broadcast:
68.71.141.139, Generation: 179
```

Meaning The sample output shows the active alarms and active defects. Sample output 1 shows no active alarms or defects.

Sample output 2 shows that the physical and logical links are down, with active alarms and defects. When a major error (such as an alarm indication signal [AIS]) is seen for a few consecutive frames, a defect is declared within 1 second from detection. At the defect level, the interface is taken down and routing protocols are immediately notified (this is the default). In most cases, when a defect persists for 2.5 seconds plus or minus 0.5 seconds, an alarm is declared.

Notification messages are logged at the alarm level. Depending on the type of T1 alarm, you can configure the craft panel to display the red or yellow alarm LED and simultaneously have the alarm relay activate a physically connected device (such as a bell).

Table 29 on page 267 shows T1 media-specific alarms or defects that can render the interface unable to pass packets.

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Table 29: T1 Media Alarms and Error Definitions

T1 Media Alarm or Error	Definitions
AIS	Alarm indication signal (blue alarm)
BEE	Block error event
BES	Bursty errored seconds
BPV	Bipolar violation
CS	Controlled slip
ES	Errored seconds
EXZ	Excessive zeros
LCV	Line code violation
LES	Line errored seconds
LOF	Loss of frame
LOS	Loss of signal
PCV	Path code violation
SEF	Severely errored frame
SEFS	Severely errored frame seconds
SES	Severely errored seconds
UAS	Unavailable seconds
YLW	Yellow alarm

See *Checklist for T1 Alarms and Errors* for more details on T1 alarms and statistics.

Related Documentation

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CHAPTER 13

Troubleshooting Multichannel DS3 Interfaces

- Monitoring Multichannel DS3 Interfaces on page 269
- Using Loopback Testing for Multichannel DS3 Interfaces on page 277
- Locating Multichannel DS3 Alarms and Errors on page 292

Monitoring Multichannel DS3 Interfaces

- Checklist for Monitoring Multichannel DS3 Interfaces on page 269
- Monitor Multichannel DS3 Interfaces on page 270

Checklist for Monitoring Multichannel DS3 Interfaces

Purpose To monitor Multichannel DS3 interfaces and begin the process of isolating Multichannel DS3 interface problems when they occur.

Action Table 30 on page 269 provides the links and commands for monitoring Multichannel DS3 interfaces.

Table 30: Checklist for Monitoring Multichannel DS3 Interfaces

Tasks	Command or Action
"Monitor Multichannel DS3 Interfaces" on page 270	
1. Display the Status of Channelized Interfaces on page 270	**show interfaces terse ds*** **show interfaces terse t1***
2. Display the Status of a Specific Channelized Interface on page 271	**show interfaces ds-*fpc/pic/port:channel:channel*** **show interfaces t1-*fpc/pic/port:channel***
3. Display Extensive Status Information for a Specific T3 Interface on page 272	**show interfaces ds-*fpc/pic/port:channel:channel* extensive** **show interfaces t1-*fpc/pic/port:channel* extensive**
4. Monitor Statistics for a Channelized Interface on page 275	**monitor interfaces ds-*fpc/pic/port:channel:channel*** **monitor interfaces t1-*fpc/pic/port:channel***

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Monitor Multichannel DS3 Interfaces

Channelized interfaces enable you to configure a number of individual channels that subdivide the bandwidth of a larger interface and minimize the number of Physical Interface Cards (PICs) that an installation requires. By monitoring channelized DS3 to DS0 interfaces or channelized DS3 to DS1 interfaces, you can begin to isolate Multichannel DS3 problems when they occur.

To monitor Multichannel DS3 interfaces, follow these steps:

1. Display the Status of Channelized Interfaces on page 270
2. Display the Status of a Specific Channelized Interface on page 271
3. Display Extensive Status Information for a Specific T3 Interface on page 272
4. Monitor Statistics for a Channelized Interface on page 275

Display the Status of Channelized Interfaces

Purpose To display the status of channelized DS3 to DS0 interfaces or channelized DS3 to DS1 interfaces, use one of the following Junos OS command-line interface (CLI) operational mode commands:

Action

```
user@host> show interfaces terse ds*
user@host> show interfaces terse t1*
```

Sample Output

The following sample output is for a channelized DS3 to DS0 interface:

```
user@host> show interfaces terse ds*
Interface       Admin Link Proto Local                 Remote
ds-2/1/0:5:1    up    up
ds-2/1/0:5:1.0  up    up   inet 192.168.140.197/30
```

The following sample output is for a channelized DS3 to DS1 interface:

```
user@host> show interfaces terse t1*
[...Output truncated...]
t1-2/1/0:16    up    down
t1-2/1/0:16.0   up    down inet 192.168.118.61/30
t1-2/1/0:17     up    up
t1-2/1/0:17.0   up    up   inet 192.168.118.49/30
t1-2/1/0:18     up    up
t1-2/1/0:18.0   up    up   inet 192.168.36.21/30
t1-2/1/0:19     up    up
t1-2/1/0:19.0   up    up   inet 192.168.118.97/30
```

Meaning The sample output shows the status of both the physical and logical interfaces. In both sample outputs, all links are up except for the first interface in the T1 sample output. The first interface, **t1-2/1/0:16**, has both the physical and logical links down.

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Display the Status of a Specific Channelized Interface

Purpose To display the status of a specific channelized DS3 to DS0 interface or channelized DS3 to DS1 interface, use one of the following CLI operational mode commands:

Action
user@host> **show interfaces ds-*fpc/pic/port:channel:channel***
user@host> **show interfaces t1-*fpc/pic/port:channel***

Sample Output

The following sample output is for a channelized DS3 to DS0 interface:

```
user@host> show interfaces ds-2/1/0:5:1
Physical interface: ds-2/1/0:5:1, Enabled, Physical link is Up
  Interface index: 36, SNMP ifIndex: 133
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 64kbps, FCS:
 16, Mode: M23,
  Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 1 (00:00:06 ago), Output: 1 (00:00:06 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS3   alarms   : None
  DS1   defects  : None
  DS3   defects  : None
  Logical interface ds-2/1/0:5:1.0 (Index 14) (SNMP ifIndex 134)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.168.140.196/30, Local: 192.168.140.197
```

The following sample output is for a channelized DS3 to DS1 interface:

```
user@host> show interfaces t1-2/1/0:19
Physical interface: t1-2/1/0:19, Enabled, Physical link is Up
  Interface index: 50, SNMP ifIndex: 59
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
 None, FCS: 16,
  Mode: M23, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 11 (00:00:06 ago), Output: 13 (00:00:04 ago)
  Input rate     : 741512 bps (224 pps)
  Output rate    : 1266528 bps (224 pps)
  DS1   alarms   : None
  DS3   alarms   : None
  DS1   defects  : None
  DS3   defects  : None
  Logical interface t1-2/1/0:19.0 (Index 27) (SNMP ifIndex 125)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None
```

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```
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.168.118.96/30, Local: 192.168118.97
```

Meaning The first line of the sample output shows the status of the link. If this line shows that the physical link is up, the physical link is healthy and can pass packets. If this line shows that the physical link is down, the physical link is unhealthy and cannot pass packets.

Display Extensive Status Information for a Specific T3 Interface

Purpose To display extensive status information about a specific channelized DS3 to DS0 interface or channelized DS3 to DS1 interface, use one of the following CLI operational mode commands:

Action

```
user@host> show interfaces ds-fpc/pic/port:channel:channel  extensive
user@host> show interfaces t1-fpc/pic/port:channel  extensive
```

Sample Output

The following sample output is for a channelized DS3 to DS0 interface:

```
user@host> show interfaces ds-2/1/0:5:1 extensive
Physical interface: ds-2/1/0:5:1, Enabled, Physical link is Up
  Interface index: 36, SNMP ifIndex: 133, Generation: 35
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 64kbps, FCS:
 16, Mode: M23,
  Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 2 (last seen 00:00:05 ago)
    Output: 2 (last sent 00:00:05 ago)
  Statistics last cleared: 2002-08-01 10:14:45 UTC (00:00:16 ago)
  Traffic statistics:
   Input  bytes  :                  524                 304 bps
   Output bytes  :                  528                 304 bps
   Input  packets:                    8                   0 pps
   Output packets:                    8                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 10, L3 incompletes:
 0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  DS1 alarms : None
  DS3 alarms : None
  DS1 defects : None
  DS3 defects : None
  T1  media:            Seconds        Count  State
    SEF                       0            0  OK
    BEE                       0            0  OK
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    YELLOW                    0            0  OK
```


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```
    BPV                         0            0
    EXZ                         0            0
    LCV                         0            0
    PCV                         0            0
    CS                          0            0
    LES                         0
    ES                          0
    SES                         0
    SEFS                        0
    BES                         0
    UAS                         0
  DS3 media:                Seconds        Count  State
    PLL Lock                    0            0  OK
    Reframing                   0            0  OK
    AIS                         0            0  OK
    LOF                         0            0  OK
    LOS                         0            0  OK
    IDLE                        0            0  OK
    YELLOW                      0            0  OK
    BPV                         0            0
    EXZ                         0            0
    LCV                         0            0
    PCV                         0            0
    LES                         0
    PES                         0
    PSES                        0
    SEFS                        0
    UAS                         0
  Interface transmit queues:
              B/W  WRR       Packets         Bytes        Drops       Errors
    Queue0     95   95             4           336            0            0
    Queue1      5    5             1            22            0            0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 3
    Timeslots      : 1
    Byte encoding: Nx64K, Data inversion: Disabled
  DS3 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Algorithm: Unknown (0), Induced Error rate: 10e-0
  DS1 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  PFE configuration:
    Destination slot: 2, PLP byte: 2 (0x2f)
    CoS transmit queue          Bandwidth          Buffer     Priority   Limit
                              %          bps   %        bytes
    0 best-effort             0            0   0            0      low    none
    1 expedited-forwarding    0            0   0            0      low    none
    2 assured-forwarding      0            0   0            0      low    none
    3 network-control         0            0   0            0      low    none
  Logical interface ds-2/1/0:5:1.0 (Index 14) (SNMP ifIndex 134) (Generation 13)

    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None, Generation: 20 Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.168.140.196/30, Local: 192.168.140.197,
Broadcast: Unspecified,
        Generation: 22
```

The following sample output is for a channelized DS3 to DS1 interface:

```
user@host> show interfaces t1-2/1/0:19 extensive
Physical interface: t1-2/1/0:19, Enabled, Physical link is Up
  Interface index: 50, SNMP ifIndex: 59, Generation: 49
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
 None, FCS: 16,
  Mode: M23, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 117 (last seen 00:00:08 ago)
    Output: 121 (last sent 00:00:01 ago)
  Statistics last cleared: 2002-08-01 10:14:45 UTC (00:19:38 ago)
  Traffic statistics:
   Input  bytes  :             22459734                236888 bps
   Output bytes  :            162288645               1322208 bps
   Input  packets:               201233                   214 pps
   Output packets:               236341                   227 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 377, L3 incompletes:
 0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM
errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  DS1 alarms : None
  DS3 alarms : None
  DS1 defects : None
  DS3 defects : None
  T1  media:            Seconds        Count  State
    SEF                       0            0  OK
    BEE                       0            0  OK
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CS                        0            0
    LES                       0
    ES                        0
    SES                       0
    SEFS                      0
    BES                       0
    UAS                       0
  DS3 media:            Seconds        Count  State
    PLL Lock                  0            0  OK
    Reframing                 0            0  OK
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
```


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```
    PCV                        0            0
    LES                        0
    PES                        0
    PSES                       0
    SEFS                       0
    UAS                        0
  Interface transmit queues:
              B/W  WRR       Packets        Bytes        Drops       Errors
    Queue0     95   95        234494    162020375            0            0
    Queue1      5    5           164         5808            0            0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 3
    Timeslots      : All active
    Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
  DS3 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Algorithm: Unknown (0), Induced Error rate: 10e-0
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  PFE configuration:
    Destination slot: 2, PLP byte: 2 (0xab)
    CoS transmit queue          Bandwidth          Buffer     Priority   Limit
                              %          bps   %        bytes
    0 best-effort             0            0   0            0      low    none
    1 expedited-forwarding    0            0   0            0      low    none
    2 assured-forwarding      0            0   0            0      low    none
    3 network-control         0            0   0            0      low    none
  Logical interface t1-2/1/0:19.0 (Index 27) (SNMP ifIndex 125) (Generation 26)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None, Generation: 34 Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.168.118.96/30, Local: 192.168.118.97,
Broadcast: Unspecified, Generation: 44
```

Meaning The sample output shows where the errors might be occurring. Look at the active alarms and active defects for the DS1 or DS3 interface and diagnose the media accordingly. See "Checklist for Locating Multichannel DS3 Alarms and Errors" on page 292 for an explanation of Multichannel DS3 alarms.

Monitor Statistics for a Channelized Interface

Purpose To monitor statistics for a channelized DS3 to DS0 interface or channelized DS3 to DS1 interface, use one of the following CLI operational mode commands:

Action

```
user@host> monitor interfaces ds-fpc/pic/port:channel:channel
user@host> monitor interfaces t1-fpc/pic/port:channel
```

Sample Output

The following sample output is for a channelized DS3 to DS0 interface:

```
user@host> monitor interface ds-2/1/0:5:1
host     Seconds: 9                  Time: 10:36:11
                                                                  Delay: 0/0/4
Interface: ds-2/1/0:5:1, Enabled, Link is Up
Encapsulation: Cisco-HDLC, Keepalives, Speed: 64kbps
Traffic statistics:                                             Current delta
```

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```
  Input bytes:                        52502 (80 bps)                    [262]
  Output bytes:                       52608 (88 bps)                    [344]
  Input packets:                        714 (0 pps)                       [4]
  Output packets:                       714 (0 pps)                       [5]
Encapsulation statistics:
  Input keepalives:                     133                               [1]
  Output keepalives:                    133                               [1]
Error statistics:
  Input errors:                           0                               [0]
  Input drops:                            0                               [0]
  Input framing errors:       0           [0]
  Input runts:                            0                               [0]
  Input giants:                           0                               [0]
  Policed discards:                     410                               [1]
  L3 incompletes:                         0                               [0]
  L2 channel errors:                      0                               [0]
  L2 mismatch timeouts:                   0                               [0]
  Carrier transitions:                    0                               [0]
  Output errors:                          0                               [0]
  Output drops:                           0                               [0]
  Aged packets:                           0Active alarms : N              [0]
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'
```

The following sample output is for a channelized DS3 to DS1 interface:

```
user@host> monitor interface t1-2/1/0:19
host     Seconds: 4                  Time: 10:37:53
                                                                  Delay: 0/0/4
Interface: t1-2/1/0:19, Enabled, Link is Up
Encapsulation: Cisco-HDLC, Keepalives, Speed: T1
Traffic statistics:                                             Current delta
  Input bytes:                  27046020 (124752 bps)              [32358]
  Output bytes:                186975710 (623840 bps)             [161809]
  Input packets:                  233498 (139 pps)                   [289]
  Output packets:                 273161 (139 pps)                   [290]
Encapsulation statistics:
  Input keepalives:                 138                               [0]
  Output keepalives:                141                               [0]
Error statistics:
  Input errors:                       0                               [0]
  Input drops:                        0                               [0]
  Input framing errors:       0       [0]
  Input runts:                        0                               [0]
  Input giants:                       0                               [0]
  Policed discards:                 439                               [0]
  L3 incompletes:                     0                               [0]
  L2 channel errors:                  0                               [0]
  L2 mismatch timeouts:               0                               [0]
  Carrier transitions:                0                               [0]
  Output errors:                      0                               [0]
  Output drops:                       0                               [0]
  Aged packets:                       0Active alarms : N              [0]
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'
```

Meaning This command checks for and displays common interface failures, indicates whether loopback is detected, and shows increases in framing errors. Use information from this command to help narrow down possible causes of an interface problem.

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NOTE: If you are accessing the router from the console connection, make sure you set the CLI terminal type using the **set cli terminal** command.

Table 31 on page 277 lists additional problem situations and actions to help you further understand an interface problem.

Table 31: Problem Situations and Actions

Problem Situation	Action
Framing errors are increasing.	Check the frame checksum sequence (FCS), scrambling, and subrate configuration.
Framing errors are increasing, and the configuration is correct.	Check the cabling to the router and have the carrier verify the integrity of the line.
Input errors are increasing.	Check the cabling to the router and have the carrier verify the integrity of the line.

NOTE: We recommend that you use this command only for diagnostic purposes. Do not leave it on during normal router operations because real-time monitoring of traffic consumes additional CPU and memory resources.

Related Documentation

Using Loopback Testing for Multichannel DS3 Interfaces

- Checklist for Using Loopback Testing for Multichannel DS3 Interfaces on page 278
- Diagnose a Suspected Hardware Problem with a Multichannel DS3 Interface on page 279
- Create a Loopback on page 279
- Verify That the Interface Is Up on page 281
- Clear Interface Statistics on page 282
- Force the Link Layer to Stay Up on page 283
- Verify the Status of the Logical Interface on page 284
- Ping the Channelized Interface on page 285
- Check for Interface Error Statistics on page 286
- Diagnose a Suspected Circuit Problem on page 290
- Create a Loop from the Router to the Network on page 290
- Create a Loop to the Router from Various Points in the Network on page 292

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Checklist for Using Loopback Testing for Multichannel DS3 Interfaces

Purpose To use loopback testing to isolate Multichannel DS3 interface problems.

Action Table 32 on page 278 provides links and commands for using loopback testing for Multichannel DS3 interfaces.

Table 32: Checklist for Using Loopback Testing for Multichannel DS3 Interfaces

Tasks	Command or Action
"Diagnose a Suspected Hardware Problem with a Multichannel DS3 Interface" on page 279	
1. Create a Loopback on page 279	
a. Create a Physical Loopback on page 280	Connect the TX port to the RX port.
b. Configure a Local Loopback on page 280	[edit interfaces *interface name* (t3-options | t1-options)] set loopback local show commit
2. Verify That the Interface Is Up on page 281	show interfaces (ds-*fpc/pic/port:channel:channel* | t1-*fpc/pic/port:channel*)
3. Clear Interface Statistics on page 282	clear interfaces statistics (t1-*fpc/pic/port:channel* | ds-*fpc/pic/port:channel:channel*)
4. Force the Link Layer to Stay Up on page 283	
a. Configure Encapsulation to Cisco-HDLC on page 283	[edit interfaces *interface-name*] set encapsulation cisco-hdlc show commit
b. Configure No-Keepalives on page 284	[edit interfaces *interface-name*] set no-keepalives show commit
5. Verify the Status of the Logical Interface on page 284	show interfaces (ds- *fpc/pic/port:channel:channel* | t1-*fpc/pic/port:channel*)
6. Ping the Channelized Interface on page 285	ping interface (ds-*fpc/pic/port:channel:channel* | t1-*fpc/pic/port:channel*) *local-IP-address* bypass-routing count 1000 rapid
7. Check for Interface Error Statistics on page 286	show interfaces (ds-*fpc/pic/port:channel:channel* | t1-*fpc/pic/port:channel*) extensive
"Diagnose a Suspected Circuit Problem" on page 290	
1. Create a Loop from the Router to the Network on page 290	

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Table 32: Checklist for Using Loopback Testing for Multichannel DS3 Interfaces *(continued)*

Tasks	Command or Action
a. Loop the Entire T3 Interface Toward the Network on page 290	**[edit interfaces *interface-name* t3-options]** **set loopback remote** **show** **commit**
b. Loop a Particular T1 Channel Toward the Network on page 291	**[edit interfaces *interface-name* t1-options]** **set loopback remote** **show** **commit**
2. Create a Loop to the Router from Various Points in the Network on page 292	Perform Steps 2 through 8 from "Diagnose a Suspected Hardware Problem with a Multichannel DS3 Interface" on page 279.

Diagnose a Suspected Hardware Problem with a Multichannel DS3 Interface

Problem **Description:** To diagnose a suspected hardware problem with a Multichannel DS3 interface, follow these steps:

Solution

- Create a Loopback on page 279
- Verify That the Interface Is Up on page 281
- Clear Interface Statistics on page 282
- Force the Link Layer to Stay Up on page 283
- Verify the Status of the Logical Interface on page 284
- Ping the Channelized Interface on page 285
- Check for Interface Error Statistics on page 286

Create a Loopback

Purpose

You can create a physical loopback or configure a local loopback to help diagnose a suspected hardware problem. Creating a physical loopback is recommended because it allows you to test and verify the Multichannel DS3 port. If a field engineer is not available to create the physical loopback, you can configure a local loopback for the interface. The local loopback creates a loopback internally in the Physical Interface Card (PIC).

1. Create a Physical Loopback on page 280
2. Configure a Local Loopback on page 280

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Create a Physical Loopback

Action

To create a physical loopback at the port, connect the transmit port to the receive port.

Meaning

When you create and test a physical loopback, you are testing the transmit and receive ports of the PIC. This action is recommended if a field engineer is available to create the physical loop as it provides a more complete test of the PIC.

Configure a Local Loopback

Action

To configure a local loopback, follow these steps:

1. In configuration mode, go to the following hierarchy level, depending on whether you are configuring a full T3 or T1 interface:

   ```
   [edit]
   user@host# edit interfaces interface-name (t3-options | t1-options)
   ```

2. Configure the local loopback:

   ```
   [edit interfaces interface-name (t3-options | t1-options)]
   user@host# set loopback local
   ```

   The following is an example of the name for a T1 channel 0, group 0, on a Multichannel DS3 port for a channelized DS3 to DS0 interface:

   ```
   [edit interfaces ds-2/1/0:0:0 t3-options]
   ```

   NOTE: In order to configure T3 options on the Multichannel DS3, you configure the first logical interfaces: ds-2/1/0:0:0 t3-options.

   The following is an example of the name for a T1 channel on a Multichannel DS3 port for a channelized DS3 to DS1 interface:

   ```
   [edit interfaces t1-2/1/1:0 t1-options]
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t1-2/1/1:0 t1-options]
   user@host# show
   loopback local;
   ```

4. Commit the configuration:

   ```
   user@host# commit
   ```

   For example:

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```
[edit interfaces t1-2/1/1:0 t1-options]
user@host# commit
commit complete
```

Meaning

When you create a local loopback, you create an internal loop on the interface being tested. A local loopback loops the traffic internally on that PIC. A local loopback tests the interconnection of the PIC but does not test the transmit and receive ports.

NOTE: Remember to delete the loopback statement after completing the test.

Verify That the Interface Is Up

Purpose Display the status of a DS1 or DS3 interface to determine whether the physical link is up or down.

Action To verify that the status of the Multichannel DS3 interface is up, use one of the following Junos OS command-line interface (CLI) operational mode commands:

user@host> **show interfaces (ds-*fpc/pic/port:channel:channel* | t1- *fpc/pic/port:channel*)**

Sample Output

The following sample output is for a channelized DS3 to DS0 interface:

```
user@host> show interfaces ds-2/1/0:5:1
Physical interface: ds-2/1/0:5:1, Enabled, Physical link is Up
  Interface index: 36, SNMP ifIndex: 133
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 64kbps, FCS:
 16, Mode: M23,
  Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 1 (00:00:06 ago), Output: 1 (00:00:06 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS3   alarms   : None
  DS1   defects  : None
  DS3   defects  : None
  Logical interface ds-2/1/0:5:1.0 (Index 14) (SNMP ifIndex 134)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.168.140.196/30, Local: 192.168.140.197
```

The following sample output is for a channelized DS3 to DS1interface:

```
user@host> show interfaces t1-2/1/0:19
Physical interface: t1-2/1/0:19, Enabled, Physical link is Up
```

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```
  Interface index: 50, SNMP ifIndex: 59
  Description: Customer
 Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
None, FCS: 16,
  Mode: M23, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 11 (00:00:06 ago), Output: 13 (00:00:04 ago)
  Input rate     : 741512 bps (224 pps)
  Output rate    : 1266528 bps (224 pps)
  DS1   alarms   : None
  DS3   alarms   : None
  DS1   defects  : None
  DS3   defects  : None
  Logical interface t1-2/1/0:19.0 (Index 27) (SNMP ifIndex 125)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.168.140.196/30, Local: 192.168.140.197
```

Meaning The sample output shows that the physical link is up and there are no DS1 or DS3 alarms or defects. You should not see any DS1or DS3 alarms. You can check any interface on the Multichannel DS3 port.

Clear Interface Statistics

Purpose

You must reset the Multichannel DS3 interface statistics before initiating the ping test. Resetting the statistics provides a clean start so that previous input/output errors and packet statistics do not interfere with the current efforts to diagnose the problem.

Action

To clear all statistics for the interface, use the following Junos OS CLI operational mode command:

user@host> **clear interfaces statistics** (**ds-***fpc/pic/port:channel:channel* | **t1-***fpc/pic/port:channel*)

Sample Output

```
user@host> clear interfaces statistics DS1/1/0:0:0
user@host>
user@host> clear interfaces statistics t1-1/1/0:0
user@host>
```

Meaning

This command clears the interface statistics counters for the Multichannel or T1 interface only.

NOTE: After a Graceful Routing Engine switchover (GRES) you must run **clear interface statistics** again or interface statistics will display junk vales.

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Force the Link Layer to Stay Up

Purpose

To complete the loopback test, the link layer must remain up. However, Junos OS is designed to recognize that loop connections are not valid connections and to bring the link layer down. You need to force the link layer to stay up by making some configuration changes to the encapsulation and keepalives.

Force the link layer to stay up, follow these steps:

1. Configure Encapsulation to Cisco-HDLC on page 283
2. Configure No-Keepalives on page 284

Configure Encapsulation to Cisco-HDLC

Action

To set the encapsulation on a T1 physical interface, follow these steps:

1. In configuration mode, go to the following hierarchy level:

   ```
   [edit]
   user@host#  edit interfaces interface-name
   ```

2. Configure Cisco-HDLC:

   ```
   [edit interfaces interface-name ]
   user@host#  set encapsulation cisco-hdlc
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t1-0/1/1:8]
   user@host# show
   encapsulation hdlc;
   ```

4. Commit the change:

   ```
   user@host# commit
   ```

   For example:

   ```
   [edit interfaces t1-0/1/1:8]
   user@host# commit
   commit complete
   ```

Meaning

This command sets the interface encapsulation to the Cisco High-Level Data-Link Control (HDLC) transport protocol.

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Configure No-Keepalives

Action

To disable the sending of link-layer keepalives on a channelized DS3 or DS0 interface, follow these steps:

1. In configuration mode, go to the following hierarchy level:

   ```
   [edit]
   user@host#  edit interfaces interface-name
   ```

2. Configure no-keepalives:

   ```
   [edit interfaces  interface-name]
   user@host# set no-keepalives
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t1-0/1/1:8]
   user@host# show
   no-keepalives;
   ```

4. Commit the change:

   ```
   user@host# commit
   ```

   For example:

   ```
   [edit interfaces t1-0/1/1:8]
   user@host# commit
   commit complete
   ```

Meaning

By setting no-keepalives, the link layer is forced to stay up. If the setting remains at keepalive, the router will recognize that the same link-layer keepalives are being looped back and will bring the link layer down.

Verify the Status of the Logical Interface

Purpose To verify the status of the logical interface, use the following Junos OS CLI operational mode command:

Action user@host> **show interfaces** (**ds-***fpc/pic/port:channel:channel* | **t1-***fpc/pic/port:channel*)

Sample Output

The following sample output is for a channelized DS3 to DS0 interface:

```
user@host> show interfaces ds-2/1/0:5:1
Physical interface: ds-2/1/0:5:1, Enabled, Physical link is Up
  Interface index: 36, SNMP ifIndex: 133
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 64kbps, FCS:
```


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```
 16, Mode: M23,
  Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 1 (00:00:06 ago), Output: 1 (00:00:06 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS3   alarms   : None
  DS1   defects  : None
  DS3   defects  : None
  Logical interface ds-2/1/0:5:1.0 (Index 14) (SNMP ifIndex 134)
    Flags: Point-To-Point  SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.10.10.196/30, Local: 10.10.10.197
```

The following sample output is for a channelized DS3 to DS1interface:

```
user@host> show interfaces t1-2/1/0:19
Physical interface: t1-2/1/0:19, Enabled, Physical link is Up
  Interface index: 50, SNMP ifIndex: 59
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
 None, FCS: 16,
  Mode: M23, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 11 (00:00:06 ago), Output: 13 (00:00:04 ago)
  Input rate     : 741512 bps (224 pps)
  Output rate    : 1266528 bps (224 pps)
  DS1   alarms   : None
  DS3   alarms   : None
  DS1   defects  : None
  DS3   defects  : None
  Logical interface t1-2/1/0:19.0 (Index 27) (SNMP ifIndex 125)
    Flags: Point-To-Point  SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.10.10.196/30, Local: 10.10.10.197
```

Meaning The sample output shows that both channelized interfaces have the physical and logical links up.

Ping the Channelized Interface

Purpose Use the **ping** command to verify the loopback connection.

Action To ping the local interface, use the following Junos OS CLI operational mode commands:

user@host> **ping interface ds-***fpc/pic/port:channel:channel* **| t1-***fpc/pic/port:channel*
local-IP-address **bypass-routing count 1000 rapid**

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Sample Output

```
user@host> ping interface t1-2/1/0:7 192.168.126.29 bypass-routing count 1000   rapid
PING 192.168.126.29 (192.168.126.29 ): 56 data bytes
!!!
```

```
  Output packets:                    8                    0 pps
 Input errors:
   Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 10, L3 incompletes:
0,
   L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0
 Output errors:
   Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
 DS1   alarms    : None
 DS3   alarms    : None
 DS1   defects   : None
 DS3   defects   : None
 T1  media:            Seconds        Count  State
   SEF                       0            0  OK
   BEE                       0            0  OK
   AIS                       0            0  OK
   LOF                       0            0  OK
   LOS                       0            0  OK
   YELLOW                    0            0  OK
   BPV                       0            0
   EXZ                       0            0
   LCV                       0            0
   PCV                       0            0
   CS                        0            0
   LES                       0
   ES                        0
   SES                       0
   SEFS                      0
   BES                       0
   UAS                       0
 DS3 media:            Seconds        Count  State
   PLL Lock                  0            0  OK
   Reframing                 0            0  OK
   AIS                       0            0  OK
   LOF                       0            0  OK
   LOS                       0            0  OK
   IDLE                      0            0  OK
   YELLOW                    0            0  OK
   BPV                       0            0
   EXZ                       0            0
   LCV                       0            0
   PCV                       0            0
   LES                       0
   PES                       0
   PSES                      0
   SEFS                      0
   UAS                       0
 Interface transmit queues:
             B/W  WRR       Packets        Bytes        Drops       Errors
   Queue0     95   95             4          336            0            0
   Queue1      5    5             1           22            0            0
 HDLC configuration:
   Giant threshold: 1514, Runt threshold: 3
   Timeslots      : 1
   Byte encoding: Nx64K, Data inversion: Disabled
 DS3 BERT configuration:
   BERT time period: 0 seconds, Elapsed: 0 seconds
   Algorithm: Unknown (0), Induced Error rate: 10e-0
 DS1 BERT configuration:
   BERT time period: 0 seconds, Elapsed: 0 seconds
   Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
 PFE configuration:
```

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```
    Destination slot: 2, PLP byte: 2 (0x2f)
    CoS transmit queue          Bandwidth          Buffer     Priority   Limit
                              %          bps   %        bytes
    0 best-effort             0            0   0            0      low    none
    1 expedited-forwarding    0            0   0            0      low    none
    2 assured-forwarding      0            0   0            0      low    none
    3 network-control         0            0   0            0      low    none
  Logical interface ds-2/1/0:5:1.0 (Index 14) (SNMP ifIndex 134) (Generation 13)

    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None, Generation: 20 Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.168.140.196/30, Local: 192.168.140.197, Broadcast:
Unspecified,
        Generation: 22
```

The following sample output is for a channelized DS3 to DS1 interface:

```
user@host> show interfaces t1-2/1/0:19 extensive
Physical interface: t1-2/1/0:19, Enabled, Physical link is Up
  Interface index: 50, SNMP ifIndex: 59, Generation: 49
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
 None, FCS: 16,
  Mode: M23, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 117 (last seen 00:00:08 ago)
    Output: 121 (last sent 00:00:01 ago)
  Statistics last cleared: 2002-08-01 10:14:45 UTC (00:19:38 ago)
  Traffic statistics:
   Input  bytes  :             22459734               236888 bps
   Output bytes  :            162288645              1322208 bps
   Input  packets:               201233                   214 pps
   Output packets:               236341                   227 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 377, L3 incompletes:
 0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM
errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  DS1   alarms   : None
  DS3   alarms   : None
  DS1   defects  : None
  DS3   defects  : None
  T1  media:            Seconds        Count  State
    SEF                       0            0  OK
    BEE                       0            0  OK
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
```


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```
    CS                          0            0
    LES                         0
    ES                          0
    SES                         0
    SEFS                        0
    BES                         0
    UAS                         0
  DS3 media:              Seconds        Count  State
    PLL Lock                    0            0  OK
    Reframing                   0            0  OK
    AIS                         0            0  OK
    LOF                         0            0  OK
    LOS                         0            0  OK
    IDLE                        0            0  OK
    YELLOW                      0            0  OK
    BPV                         0            0
    EXZ                         0            0
    LCV                         0            0
    PCV                         0            0
    LES                         0
    PES                         0
    PSES                        0
    SEFS                        0
    UAS                         0
  Interface transmit queues:
              B/W  WRR       Packets        Bytes        Drops       Errors
    Queue0     95   95        234494    162020375            0            0
    Queue1      5    5           164         5808            0            0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 3
    Timeslots      : All active
    Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
  DS3 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Algorithm: Unknown (0), Induced Error rate: 10e-0
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  PFE configuration:
    Destination slot: 2, PLP byte: 2 (0xab)
    CoS transmit queue          Bandwidth          Buffer     Priority   Limit
                              %          bps   %        bytes
    0 best-effort             0            0   0            0      low    none
    1 expedited-forwarding    0            0   0            0      low    none
    2 assured-forwarding      0            0   0            0      low    none
    3 network-control         0            0   0            0      low    none
  Logical interface t1-2/1/0:19.0 (Index 27) (SNMP ifIndex 125) (Generation 26)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None, Generation: 34 Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.168.140.196/30, Local: 192.168.140.197, Broadcast:
Unspecified, Generation: 44
```

Meaning Check for any error statistics that may appear in the output. There should not be any input or output errors. If there are any persistent input or output errors, open a case with JTAC at **support@juniper.net**, or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

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Diagnose a Suspected Circuit Problem

Problem **Description:** When you suspect a circuit problem, it is important to work with the transport-layer engineer to resolve the problem. The transport-layer engineer may ask you to create a loop from the router to the network, or the engineer may create a loop to the router from various points in the network.

Solution To diagnose a suspected circuit problem, follow these steps:

- Create a Loop from the Router to the Network on page 290
- Create a Loop to the Router from Various Points in the Network on page 292

Create a Loop from the Router to the Network

To create a loop from the router to the network, follow these steps:

1. Loop the Entire T3 Interface Toward the Network on page 290
2. Loop a Particular T1 Channel Toward the Network on page 291

Loop the Entire T3 Interface Toward the Network

Purpose

Creating a loop from the entire T3 interface to the network allows the transport-layer engineer to test the router from various points in the network and isolate the problem.

Action

To create a loop from the entire T3 interface to the network, follow these steps:

1. In configuration mode, go to the following hierarchy level:

   ```
   [edit]
   user@host# edit interfaces interface-name t3-options
   ```

2. Configure the loopback:

   ```
   [edit interfaces  interface-name  t3-options]
   user@host# set loopback remote
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t3-2/1/1:0 t3-options]
   user@host# show
   loopback remote;
   ```

4. Commit the configuration:

   ```
   user@host# commit
   ```

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Meaning

The **loopback remote** command loops any traffic from the network back into the network.

The interface name is one of the following:

- T1 channel 0, channel group 0, on the Multichannel DS3 port for a channelized DS3 to DS0 interface (for example, **ds-2/1/1:0:0**)
- T1 channel 0 on the Multichannel DS3 port for a channelized DS3 to DS1 interface (for example, **t1-2/1/1:0**)

Loop a Particular T1 Channel Toward the Network

Purpose

Creating a loop from a particular T1 interface to the network allows the transport-layer engineer to test the T1 interface from various points in the network and isolate the problem.

Action

To create a loop from a particular T1 interface to the network, follow these steps:

1. In configuration mode, go to the following hierarchy level:

   user@host# edit interfaces *interface-name* t1-options

2. Configure the loopback:

   [edit interfaces *interface-name* t1-options]
   user@host# set loopback remote

3. Verify the configuration:

   user@host# show

   For example:

   [edit interfaces ds-2/1/1:0:0 t1-options]
   user@host# show
   loopback remote;

4. Commit the configuration:

   user@host# commit

Meaning

This command loops any traffic from the network back into the network. The interface name is one of the following:

- Channel group 0 for the particular T1 channel on the Multichannel DS3 port for a channelized DS3 to DS3 interface (for example, **ds-2/1/1:2:0**)
- Particular T1 channel on the Multichannel DS3 port for a channelized DS3 to DS1 interface (for example, **t1-2/1/1:3**)

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Create a Loop to the Router from Various Points in the Network

Purpose

The transport-layer engineer creates a loop to the router from various points in the network. You can then perform tests to verify the connection from the router to that loopback in the network.

Action

After the transport-layer engineer has created the loop to the router from the network, you must verify the connection from the router to the loopback in the network. Follow Step 2 through Step 7 in "Diagnose a Suspected Hardware Problem with a Multichannel DS3 Interface" on page 279. Keep in mind that any problems encountered in the test indicate a problem with the connection from the router to the loopback in the network.

By performing tests to loopbacks at various points in the network, you can isolate the source of the problem.

Related Documentation

Locating Multichannel DS3 Alarms and Errors

- Checklist for Locating Multichannel DS3 Alarms and Errors on page 292
- Display Alarms and Errors for Channelized DS3 to DS1 Interfaces on page 292
- Display Alarms and Errors for Channelized DS3 to DS0 Interfaces on page 295

Checklist for Locating Multichannel DS3 Alarms and Errors

Purpose To check for the most common Multichannel DS3 alarms and errors encountered when investigating line problems on a Juniper Networks router.

Action Table 33 on page 292 provides links and commands for Multichannel DS3 alarms and errors.

Table 33: Checklist for MultichannelDS3 Alarms and Errors

Tasks	Command or Action
"Display Alarms and Errors for Channelized DS3 to DS1 Interfaces" on page 292	show interfaces t1-*fpc/pic/port:channel* extensive
"Display Alarms and Errors for Channelized DS3 to DS0 Interfaces" on page 295	show interfaces ds-*fpc/pic/port:channel:channel* extensive

Display Alarms and Errors for Channelized DS3 to DS1 Interfaces

Purpose To display channelized DS3 to DS1 alarms and errors, use the following Junos OS command-line interface (CLI) operational mode command:

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Action user@host> **show interfaces t1-*fpc/pic/port:channel* extensive**

Sample Output

```
user@host> show interfaces t1-2/1/0:19 extensive
Physical interface: t1-2/1/0:19, Enabled, Physical link is Up
  Interface index: 50, SNMP ifIndex: 59, Generation: 49
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
 None, FCS: 16,
  Mode: M23, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 117 (last seen 00:00:08 ago)
    Output: 121 (last sent 00:00:01 ago)
  Statistics last cleared: 2002-08-01 10:14:45 UTC (00:19:38 ago)
  Traffic statistics:
   Input  bytes  :             22459734               236888 bps
   Output bytes  :            162288645              1322208 bps
   Input  packets:               201233                   214 pps
   Output packets:               236341                   227 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 377, L3 incompletes:
 0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM
errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  DS1 alarms : None
  DS3 alarms : None
  DS1 defects : None
  DS3 defects : None
  T1  media:            Seconds        Count  State
    SEF                       0            0  OK
    BEE                       0            0  OK
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CS                        0            0
    LES                       0
    ES                        0
    SES                       0
    SEFS                      0
    BES                       0
    UAS                       0
  DS3 media:            Seconds        Count  State
    PLL Lock                  0            0  OK
    Reframing                 0            0  OK
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
```

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```
    BPV                         0           0
    EXZ                         0           0
    LCV                         0           0
    PCV                         0           0
    LES                         0
    PES                         0
    PSES                        0
    SEFS                        0
    UAS                         0
  Interface transmit queues:
              B/W  WRR       Packets        Bytes        Drops       Errors
    Queue0     95   95        234494    162020375            0            0
    Queue1      5    5           164         5808            0            0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 3
    Timeslots      : All active
    Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
  DS3 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Algorithm: Unknown (0), Induced Error rate: 10e-0
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  PFE configuration:
    Destination slot: 2, PLP byte: 2 (0xab)
    CoS transmit queue          Bandwidth          Buffer     Priority   Limit
                              %          bps   %        bytes
    0 best-effort             0            0   0            0      low    none
    1 expedited-forwarding    0            0   0            0      low    none
    2 assured-forwarding      0            0   0            0      low    none
    3 network-control         0            0   0            0      low    none
  Logical interface t1-2/1/0:19.0 (Index 27) (SNMP ifIndex 125) (Generation 26)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None, Generation: 34 Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.168.140.196/30, Local: 192.168.140.197, Broadcast:
Unspecified, Generation: 44
```

Meaning

The sample output shows that there are no active alarms and active defects. When a major error (such as an alarm indication signal [AIS]) is seen for a few consecutive frames, a defect is declared within 1 second from detection. At the defect level, the interface is taken down and routing protocols are immediately notified (this is the default). In most cases, when a defect persists for 2.5 seconds plus or minus 0.5 seconds, an alarm is declared.

Notification messages are logged at the alarm level. Depending on the type of T1 alarm, you can configure the craft panel to display the red or yellow alarm LED and simultaneously have the alarm relay activate a physically connected device (such as a bell). Table 34 on page 295 shows T1 media-specific alarms or defects that can render the interface unable to pass packets.

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Table 34: T1 Media Alarms and Error Definitions

T1 Media Alarm or Error	Definitions
AIS	Alarm indication signal (blue alarm)
BEE	Block error event
BES	Bursty errored seconds
BPV	Bipolar violation
CS	Controlled slip
ES	Errored seconds
EXZ	Excessive zeros
LCV	Line code violation
LES	Line errored seconds
LOF	Loss of frame
LOS	Loss of signal
PCV	Path code violation
SEF	Severely errored frame
SEFS	Severely errored frame seconds
SES	Severely errored seconds
UAS	Unavailable seconds
YLW	Yellow alarm

See *Checklist for T1 Alarms and Errors* for more details on T1 alarms and statistics.

Display Alarms and Errors for Channelized DS3 to DS0 Interfaces

Purpose To display T3 alarms and errors for channelized DS3 to DS0 interfaces, use the following Junos OS CLI operational mode command:

Action user@host> **show interfaces ds-*fpc/pic/port:channel:channel* extensive**

Sample Output

```
user@host> show interfaces ds-2/1/0:5:1 extensive
```

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```
Physical interface: ds-2/1/0:5:1, Enabled, Physical link is Up
  Interface index: 36, SNMP ifIndex: 133, Generation: 35
  Description: Customer
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: 64kbps, FCS:
 16, Mode: M23,
  Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 2 (last seen 00:00:05 ago)
    Output: 2 (last sent 00:00:05 ago)
  Statistics last cleared: 2002-08-01 10:14:45 UTC (00:00:16 ago)
  Traffic statistics:
   Input  bytes  :                 524                 304 bps
   Output bytes  :                 528                 304 bps
   Input  packets:                   8                   0 pps
   Output packets:                   8                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 10, L3 incompletes:
 0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  DS1   alarms   : None
  DS3   alarms   : None
  DS1   defects  : None
  DS3   defects  : None
  T1  media:            Seconds        Count  State
    SEF                       0            0  OK
    BEE                       0            0  OK
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CS                        0            0
    LES                       0
    ES                        0
    SES                       0
    SEFS                      0
    BES                       0
    UAS                       0
  DS3 media:            Seconds        Count  State
    PLL Lock                  0            0  OK
    Reframing                 0            0  OK
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    LES                       0
```


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```
    PES                       0
    PSES                      0
    SEFS                      0
    UAS                       0
  Interface transmit queues:
              B/W  WRR       Packets        Bytes        Drops       Errors
    Queue0     95   95             4          336            0            0
    Queue1      5    5             1           22            0            0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 3
    Timeslots      : 1
    Byte encoding: Nx64K, Data inversion: Disabled
  DS3 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Algorithm: Unknown (0), Induced Error rate: 10e-0
  DS1 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
  PFE configuration:
    Destination slot: 2, PLP byte: 2 (0x2f)
    CoS transmit queue          Bandwidth          Buffer     Priority   Limit
                              %          bps   %        bytes
    0 best-effort             0            0   0            0      low    none
    1 expedited-forwarding    0            0   0            0      low    none
    2 assured-forwarding      0            0   0            0      low    none
    3 network-control         0            0   0            0      low    none
  Logical interface ds-2/1/0:5:1.0 (Index 14) (SNMP ifIndex 134) (Generation 13)

    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None, Generation: 20 Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.168.118.96/30, Local: 192.168.118.97, Broadcast:
Unspecified,
        Generation: 22
```

Meaning

The sample output shows that there are no active alarms and active defects. When a major error (such as an AIS) is seen for a few consecutive frames, a defect is declared within 1 second from detection. At the defect level, the interface is taken down and routing protocols are immediately notified (this is the default). In most cases, when a defect persists for 2.5 seconds plus or minus 0.5 seconds, an alarm is declared.

Notification messages are logged at the alarm level. Depending on the type of T3 alarm, you can configure the craft panel to display the red or yellow alarm LED and simultaneously have the alarm relay activate a physically connected device (such as a bell).

NOTE: T3 is a general term used to refer to the transmission of 44.736-Mbps digital circuits over any media. T3 can be transported over copper, fiber, or radio. DS3 is the term for the electrical signal found at the metallic interface for this circuit where most of the testing is performed.

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"T1 Media Alarms and Error Definitions" on page 292 shows T3 media-specific alarms or errors that can render the interface unable to pass packets.

Table 35: T3 Interface Error Counter Definitions

T3 Alarm or Error	Definition
AIS	Alarm indication signal
EXZ	Excessive zeros
FERF	Far-end failures
IDLE	Idle code detected
LCV	Line code violation
LOS	Loss of signal
LOF	Loss of frame
YLW	Remote defect indication (yellow alarm)
PLL	Phase locked loop

See *Checklist of Common T3 Alarms and Errors* for more details on T3 alarms and statistics.

Related Documentation

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CHAPTER 14

Troubleshooting Channelized OC12 Interfaces

- Monitoring Channelized OC12 Interfaces on page 299
- Using Loopback Testing for Channelized OC12 Interfaces on page 318
- Locating Channelized OC12 Alarms and Errors on page 332

Monitoring Channelized OC12 Interfaces

- Checklist for Monitoring Channelized OC12 Interfaces on page 299
- Monitor Channelized OC12 Interfaces on page 300
- Monitor Channelized OC12 IQ Interfaces on page 305

Checklist for Monitoring Channelized OC12 Interfaces

Purpose To monitor Channelized OC12 interfaces and begin the process of isolating Channelized OC12 interface problems when they occur.

Action Table 36 on page 299 provides links and commands for monitoring Channelized OC12 interfaces.

Table 36: Checklist for Monitoring Channelized OC12 Interfaces

Tasks	Command or Action
"Monitor Channelized OC12 Interfaces" on page 300	
1. Display the Status of Channelized OC12 Interfaces on page 300	**show interfaces terse t3-*interface-name****
2. Display the Status of a Specific Channelized OC12 Interface on page 301	**show interfaces terse t3-*fpc/pic/port:channel***
3. Display Extensive Status Information for a Specific Channelized OC12 Interface on page 302	**show interfaces t3-*fpc/pic/port:channel* extensive**
4. Monitor Statistics for a Channelized OC12 Interface on page 304	**monitor interfaces t3-*fpc/pic/port:channel***
"Monitor Channelized OC12 IQ Interfaces" on page 305	

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Table 36: Checklist for Monitoring Channelized OC12 Interfaces *(continued)*

Tasks	Command or Action
1. Display the Status of a Channelized OC12 IQ Interface on page 305	show interfaces terse coc* show interfaces controller show interfaces terse
2. Display the Status of the Controller Channelized OC12 IQ Interface on page 309	show interfaces interface-type-*fpc/pic/port* show interfaces *interface-type-fpc/pic/port* show interfaces *interface-type-fpc/pic/port:channel* show interfaces interface-type-*fpc/pic/port:channel:channel* show interfaces interface-type-*fpc/pic/port:channel:channel:channel*
3. Display the Status of a Specific Channel of a Channelized OC12 IQ Interface on page 311	show interfaces *interface-type-fpc/pic/port:channel* show interfaces *interface-type-fpc/pic/port:channel:channel* show interfaces *interface-type-fpc/pic/port:channel:channel:channel*
4. Display Extensive Status Information for a Channelized OC12 IQ Interface on page 314	show interfaces *interface-type-interface-name* extensive
5. Monitor Statistics for a Channelized OC12 IQ Interface on page 316	monitor interfaces *interface-type-fpc/pic/port:channel*

Monitor Channelized OC12 Interfaces

Purpose

By monitoring Channelized OC12 interfaces, you begin the process of isolating Channelized OC12 interface problems when they occur.

To monitor your Channelized OC12 interfaces, follow these steps:

1. Display the Status of Channelized OC12 Interfaces on page 300
2. Display the Status of a Specific Channelized OC12 Interface on page 301
3. Display Extensive Status Information for a Specific Channelized OC12 Interface on page 302
4. Monitor Statistics for a Channelized OC12 Interface on page 304

Display the Status of Channelized OC12 Interfaces

Purpose To display the status of Channelized OC12 interfaces, use the following Junos OS command-line interface (CLI) operational mode command:

Action user@host> **show interfaces terse t3-*interface-name****

Sample Output 1

The following sample output is for a Channelized OC12 interface:

```
user@host> show interfaces terse t3-0/3/0:*
Interface               Admin Link Proto Local                 Remote
t3-0/3/0:0              up    up
```


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```
t3-0/3/0:1                  up    up
t3-0/3/0:2                  up    up
t3-0/3/0:3                  up    up
t3-0/3/0:4                  up    up
t3-0/3/0:5                  up    up
t3-0/3/0:6                  up    up
t3-0/3/0:7                  up    up
t3-0/3/0:8                  up    up
t3-0/3/0:9                  up    up
t3-0/3/0:10                 up    up
t3-0/3/0:11                 up    down
```

Meaning

The sample output shows the status of both the physical and logical interfaces. In this example, all of the Channelized OC12 interfaces are up except the channel interface **t3-0/3/0:11**.

When only one or some individual T3 channels are down, you must troubleshoot the T3 channel by checking the configuration, transmission network, and equipment. If all of the physical layers for the T3 channels are down, you must work with this as a T3 or OC12 SONET link, or a Physical Interface Card (PIC) problem. For more information on monitoring SONET interfaces, see "Checklist for Monitoring Channelized OC12 Interfaces" on page 299.

Display the Status of a Specific Channelized OC12 Interface

Purpose To display the status of specific Channelized OC12 interface, use the following Junos OS CLI operational mode command:

Action user@host> **show interfaces terse t3-*fpc/pic/port:channel***

Sample Output

```
user@host> show interfaces terse t3-0/3/0:0
Interface               Admin Link Proto Local                 Remote
t3-0/3/0:0              up    up

user@host> show interfaces terse t3-0/3/0:11
Interface               Admin Link Proto Local                 Remote
t3-0/3/0:11             up    down
```

Meaning

The first line of the output shows the status of the link. If this line shows that the physical link is up, the physical link is healthy and can pass packets. If this line shows that the physical link is down, the physical link is unhealthy and cannot pass packets.

When only one or some individual T3 channels are down, you must troubleshoot the T3 channel by checking the configuration, transmission network, and equipment. If all of the physical layers for the T3 channels are down, you must work with this as an OC12 SONET link or PIC problem. For more information on monitoring SONET interfaces, see "Checklist for Monitoring Channelized OC12 Interfaces" on page 299.

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Display Extensive Status Information for a Specific Channelized OC12 Interface

Purpose To display extensive status information for a Channelized OC12 interface, use the following Junos OS CLI operational mode command:

Action user@host> **show interfacest3-*fpc/pic/port*:*channel* extensive**

Sample Output

```
user@host> show interfaces t3-0/3/0:0 extensive
Physical interface: t3-0/3/0:0, Enabled, Physical link is Up
  Interface index: 193, SNMP ifIndex: 118, Generation: 122
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: T3,
  Loopback: Local, SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2004-05-21 15:23:34 UTC (01:59:02 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Bucket drops: 0, Policed discards:
0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  DS3   alarms   : None
  SONET alarms   : None
  DS3   defects  : None
  SONET defects  : None
  DS3 media:            Seconds        Count  State
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CCV                       0            0
    LES                       0
    PES                       0
    PSES                      0
    CES                       0
    CSES                      0
    SEFS                      0
    UAS                       0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 4484, Runt threshold: 3
    Idle cycle flag: flags, Start end flag: shared
```


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```
DSU configuration:
  Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
  FEAC loopback: Inactive, Response: Disabled, Count: 0
DS-3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
Interface transmit queues:
                 B/W  WRR       Packets        Bytes
  Queue0           0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
  Queue1           0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
  Queue2           0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
  Queue3           0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
SONET PHY:            Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                 0            0  OK
SONET section:
  BIP-B1                    1           22
  SEF                       0            0  OK
  LOS                       0            0  OK
  LOF                       0            0  OK
  ES-S                      1
  SES-S                     0
  SEFS-S                    0
SONET line:
  BIP-B2                    1          307
  REI-L                     0            0
  RDI-L                     3            1  OK
  AIS-L                     0            0  OK
  BERR-SF                   0            0  OK
  BERR-SD                   0            0  OK
  ES-L                      1
  SES-L                     0
  UAS-L                     0
  ES-LFE                    3
  SES-LFE                   3
  UAS-LFE                   0
SONET path:
  BIP-B3                    1           35
  REI-P                     1            7
  LOP-P                     0            0  OK
  AIS-P                     0            0  OK
  RDI-P                     0            0  OK
  UNEQ-P                    0            0  OK
  PLM-P                     1            1  OK
  ES-P                      1
  SES-P                     0
  UAS-P                     0
  ES-PFE                    1
  SES-PFE                   0
```

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```
  UAS-PFE                   0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
Received path trace: t3-0/1/0:0
  74 33 2d 30 2f 31 2f 30 3a 30 00 00 00 00 0d 0a   t3-0/1/0:0......
Transmitted path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 00 00   t3-0/3/0:0......
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 1 (0x00)
  CoS transmit queue             Bandwidth           Buffer Priority   Limit
                              %          bps   %        bytes
  0 best-effort              95     42499200  95            0      low    none
  3 network-control           5      2236800   5            0      low    none
```

Meaning

The sample output shows where the errors might be occurring, either with the T3 media or the SONET layer. In this example, there are no SONET or DS3 alarms or defects. However, if errors occur, you must troubleshoot the T3 media or the SONET layer.

Monitor Statistics for a Channelized OC12 Interface

Purpose To monitor statistics for a Channelized OC12 interface, use the following Junos OS CLI operational mode command:

Action user@host> **monitor interfaces t3-*fpc/pic/port*:*channel***

Sample Output

```
user@host> monitor interfaces t3-0/3/0:11
host      Seconds: 12                  Time: 17:27:15
                                                          Delay: 32/0/32
Interface: t3-0/3/0:11, Enabled, Link is Down
Encapsulation: Cisco-HDLC, Keepalives, Speed: T3
Traffic statistics:                                        Current delta
  Input bytes:                    109846 (176 bps)                 [44]
  Output bytes:                   110308 (176 bps)                 [44]
  Input packets:                    1687 (1 pps)                    [2]
  Output packets:                   1693 (1 pps)                    [2]
Encapsulation statistics:
  Input keepalives:                    8                            [2]
  Output keepalives:                   7                            [2]
Error statistics:
  Input errors:                        0                            [0]
  Input drops:                         0                            [0]
  Input framing errors:             1066                            [0]
  Input runts:                         0                            [0]
  Input giants:                        0                            [0]
  Policed discards:                    0                            [0]
  L3 incompletes:                      0                            [0]
  L2 channel errors:                   3                            [0]
  L2 mismatch timeouts:                0                            [0]
  Carrier transitions:                 7                            [0]
```


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```
  Output errors:                        0  Output drops:                [0]
Interface warnings:
  o Loopback detected while not in test mode
```

Meaning

The sample output shows common interface failures, indicates whether loopback is detected, and shows increases in framing errors. Use information from this command to help narrow down possible causes of an interface problem.

NOTE: If you are accessing the router from the console connection, make sure you set the CLI terminal type using the **set cli terminal** command.

CAUTION: We recommend that you use this command only for diagnostic purposes. Do not leave it on during normal router operations because real-time monitoring of traffic consumes additional CPU and memory resources.

Monitor Channelized OC12 IQ Interfaces

Purpose

By monitoring Channelized OC12 intelligent queuing (IQ) interfaces, you begin the process of isolating Channelized OC12 IQ interface problems when they occur.

To monitor your Channelized OC12 IQ interface, follow these steps:

1. Display the Status of a Channelized OC12 IQ Interface on page 305
2. Display the Status of the Controller Channelized OC12 IQ Interface on page 309
3. Display the Status of a Specific Channel of a Channelized OC12 IQ Interface on page 311
4. Display Extensive Status Information for a Channelized OC12 IQ Interface on page 314
5. Monitor Statistics for a Channelized OC12 IQ Interface on page 316

Display the Status of a Channelized OC12 IQ Interface

Purpose To display the status of Channelized OC12 IQ interfaces, use one or all of the following Junos OS CLI operational mode commands:

Action

```
user@host> show interfaces terse coc*
user@host> show interfaces controller
user@host> show interfaces terse
```

Sample Output 1

```
user@host> show interfaces terse coc*
Interface               Admin Link Proto Local                 Remote
coc12-0/0/0             up    up
coc1-0/0/0:2     up  up
coc1-0/0/0:3     up  up
```

```
coc1-0/0/0:4       up  up
coc1-0/0/0:5       up  up
coc1-0/0/0:6       up  up
```

Sample Output 2

```
user@host> show interfaces controller
Controller                                                                Admin Link
coc12-0/0/0                                                               up    up
    so-0/0/0:1                          up  up
    coc1-0/0/0:2                         up  up
        t1-0/0/0:2:1                      up  up
        t1-0/0/0:2:2                      up  up
        t1-0/0/0:2:3                      up  up
        t1-0/0/0:2:4                                                      up    up
        t1-0/0/0:2:5                                                      up    up
        t1-0/0/0:2:6                                                      up    up
        t1-0/0/0:2:7                                                      up    up
        t1-0/0/0:2:8                                                      up    up
        t1-0/0/0:2:9                                                      up    up
        t1-0/0/0:2:10                                                     up    up
        t1-0/0/0:2:11                                                     up    up
        t1-0/0/0:2:12                                                     up    up
        t1-0/0/0:2:13                                                     up    up
        t1-0/0/0:2:14                                                     up    up
        t1-0/0/0:2:15                                                     up    up
        t1-0/0/0:2:16                                                     up    up
        t1-0/0/0:2:17                                                     up    up
        t1-0/0/0:2:18                                                     up    up
        t1-0/0/0:2:19                                                     up    up
        t1-0/0/0:2:20                                                     up    up
        t1-0/0/0:2:21                                                     up    up
        t1-0/0/0:2:22                                                     up    up
        t1-0/0/0:2:23                                                     up    up
        t1-0/0/0:2:24                                                     up    up
        t1-0/0/0:2:25                                                     up    up
        t1-0/0/0:2:26                                                     up    up
        t1-0/0/0:2:27                                                     up    up
        t1-0/0/0:2:28                                                     up    up
    coc1-0/0/0:3                                                          up    up
    t3-0/0/0:3                                                            up    up
    coc1-0/0/0:4                                                          up    up
        ct1-0/0/0:4:1                                                     up    up
            ds-0/0/0:4:1:1                                                up    up
    coc1-0/0/0:5                                                          up    up
    ct3-0/0/0:5                                                           up    up
        t1-0/0/0:5:1                                                      up    up
    coc1-0/0/0:6                                                          up    up
    ct3-0/0/0:6                                                           up    up
        ct1-0/0/0:6:1                                                     up    up
            ds-0/0/0:6:1:1                                                up    up
```

Sample Output 3

```
user@host> show interfaces terse
Interface               Admin Link Proto Local                 Remote
coc12-0/0/0             up    up
so-0/0/0:1              up    up
so-0/0/0:1.0       up   up  inet 20.20.20.1/30
coc1-0/0/0:2            up    up
t1-0/0/0:2:1            up    up
```


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```
t1-0/0/0:2:1.0          up    up   inet  20.20.20.5/30
t1-0/0/0:2:2            up    up
[...Output Truncated...]
t1-0/0/0:2:27           up    up
t1-0/0/0:2:28           up    up
coc1-0/0/0:3            up    up
t3-0/0/0:3              up    up
coc1-0/0/0:4            up    up
ct1-0/0/0:4:1           up    up
ds-0/0/0:4:1:1          up    up
ds-0/0/0:4:1:1.0        up    up   inet  20.20.20.13/30
coc1-0/0/0:5            up    up
ct3-0/0/0:5             up    up
t1-0/0/0:5:1            up    up
t1-0/0/0:5:1.0          up    up   inet  20.20.20.17/30
coc1-0/0/0:6            up    up
ct3-0/0/0:6             up    up
ct1-0/0/0:6:1           up    up
ds-0/0/0:6:1:1          up    up
ds-0/0/0:6:1:1.0        up    up   inet  20.20.20.21/30
```

Meaning

The sample output shows the status of both the physical and logical interfaces. In this example, all of the channelized OC12 IQ interfaces are up.

Sample output 1 shows the channelized interfaces that are configured, but not the channels for those channelized interfaces.

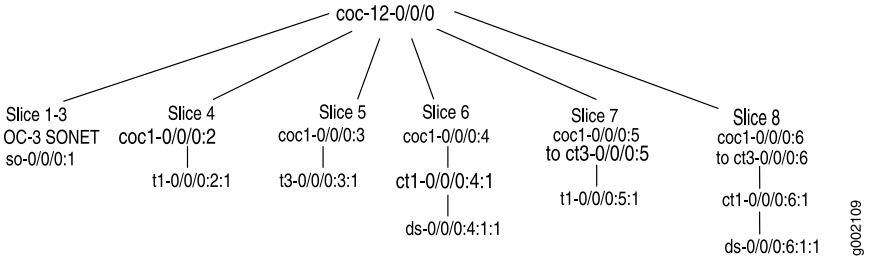
Sample output 2 shows the channels for the channelized interfaces that are configured and the hierarchy, but not the interface address information. At the top, the hierarchy includes the controller interface **coc12-0/0/0**.

Sample output 3 shows all channelized interfaces and their configured channels and the address information.

When only one or some individual channels are down, you must troubleshoot the channel by checking the configuration, transmission network, and equipment. If all of the physical layers for the channels are down, you must work with this as a T1, T3, DS0, or OC12 SONET link or PIC problem. For more information on monitoring these types of interfaces, see the respective sections in this guide.

The interface configuration of the OC12 IQ interface used for all **show** commands in this section is shown in Figure 39 on page 307.

Figure 39: Sample Configuration of Channelized OC12 IQ Interface



In addition, the configuration is shown in the following output:

```
interfaces {
    coc12-0/0/0 {
        partition 1 oc-slice 1-3 interface-type so;
        partition 2 oc-slice 4 interface-type coc1;
        partition 3 oc-slice 5 interface-type coc1;
        partition 4 oc-slice 6 interface-type coc1;
        partition 5 oc-slice 7 interface-type coc1;
        partition 6 oc-slice 8 interface-type coc1;
    }
    so-0/0/0:1 {
        description "oc-slice 1-3 of coc12-0/0/0. COC12 > OC3.";
        unit 0 {
            family inet {
                address 20.20.20.2/30;
            }
        }
    }
    coc1-0/0/0:2 {
        description "oc-slice 4 of coc12-0/0/0. COC12 to COC1 VT-mapped to T1s.";
        partition 1-28 interface-type t1;
    }
    t1-0/0/0:2:1 {
        unit 0 {
            family inet {
                address 20.20.20.6/30;
            }
        }
    }
    coc1-0/0/0:3 {
        description " oc-slice 5 of coc12-0/0/0. COC12 to COC1 converted to a T3.";
        no-partition interface-type t3;
    }
    t3-0/0/0:3:1 {
        unit 0 {
            family inet {
                address 20.20.20.10/30;
            }
        }
    }
    coc1-0/0/0:4 {
        description " oc-slice 6 of coc12-0/0/0. CT1 to NxDS-Os.";
        partition 1 interface-type ct1;
    }
    ct1-0/0/0:4:1 {
        partition 1 timeslots 1-10 interface-type ds;
    }
    ds-0/0/0:4:1:1 {
        unit 0 {
            family inet {
                address 20.20.20.14/30;
            }
        }
    }
    coc1-0/0/0:5 {
```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```
    description " oc-slice 7 of coc12-0/0/0. COC12 to COC1 converted to a CT3 to T1s.";
    no-partition interface-type ct3;
  }
  ct3-0/0/0:5 {
    partition 1 interface-type t1;
  }
  t1-0/0/0:5:1 {
    unit 0 {
      family inet {
        address 20.20.20.18/30;
      }
    }
  }
  coc1-0/0/0:6 {
    description " oc-slice 8 of coc12-0/0/0. COC12 to COC1 converted to a CT3 to CT1 to
      NxDS-0s.";
    no-partition interface-type ct3;
  }
  ct3-0/0/0:6 {
    partition 1 interface-type ct1;
  }
  ct1-0/0/0:6:1 {
    partition 1 timeslots 1 interface-type ds;
  }
  ds-0/0/0:6:1:1 {
    unit 0 {
      family inet {
        address 20.20.20.22/30;
      }
    }
  }
}
```

The above configuration shows the OC12 IQ interface configured into eight channels or slices as shown in Figure 39 on page 307. A summary of the channels follows:

- Channels 1 through 3 are for SONET interfaces
- Channel 4 is for T1 interfaces
- Channel 5 is for T3 interfaces
- Channel 6 is for DS0 interfaces
- Channels 7 is for T1 interfaces
- Channel 8 is for DS0 interfaces

Display the Status of the Controller Channelized OC12 IQ Interface

Purpose To display the status of the controller OC12 IQ interface, use one or all of the following Junos OS CLI operational mode commands, depending on the level of channelization:

Action

```
user@host> show interfaces interface-type-fpc/pic/port
user@host> show interfaces interface-type-fpc/pic /port:channel:channel
user@host> show interfaces interface-type-fpc/pic/port:channel:channel:channel
```

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Sample Output 1

```
user@host> show interfaces coc12-0/0/0
Physical interface: coc12-0/0/0, Enabled, Physical link is Up
  Interface index: 195, SNMP ifIndex: 82
  Link-level type: Controller , Clocking: Internal, SONET mode, Speed: OC12,
  Loopback: None, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : 2004-05-26 21:37:18 UTC (00:44:19 ago)
  SONET alarms   : None
  SONET defects  : None
```

Sample Output 2

```
user@host> show interfaces coc1-0/0/0:2
Physical interface: coc1-0/0/0:2, Enabled, Physical link is Up
  Interface index: 198, SNMP ifIndex: 88
  Link-level type: Controller , Clocking: Internal, SONET mode, Speed: 51840kbps,
  Loopback: None, Parent: coc12-0/0/0  Interface index 195
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : 2004-05-26 22:19:18 UTC (00:07:06 ago)
  SONET alarms   : None
  SONET defects  : None
```

Sample Output 3

```
user@host> show interfaces ct3-0/0/0:5
Physical interface: ct3-0/0/0:5, Enabled, Physical link is Up
  Interface index: 233, SNMP ifIndex: 169
  Link-level type: Controller , Clocking: Internal, Speed: T3, Loopback: None,
  Mode: C/Bit parity, Parent: coc1-0/0/0:5 Interface index 232
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : Never
  Active alarms  : None
  Active defects : None
  DS-3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
```

Sample Output 4

```
user@host> show interfaces ct1-0/0/0:4:1
Physical interface: ct1-0/0/0:4:1, Enabled, Physical link is Up
  Interface index: 230, SNMP ifIndex: 167
  Link-level type: Controller , Clocking: Internal, Speed: T1, Loopback: None,
  Framing: ESF, Parent: coc1-0/0/0:4  Interface index 229
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  CoS queues     : 4 supported
  Last flapped   : Never
  DS1   alarms   : None
```


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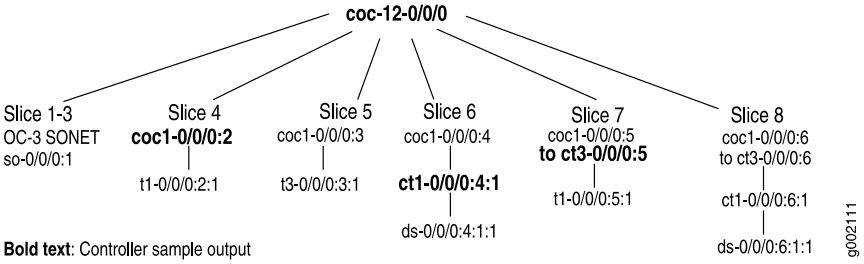
```
  DS1   defects  : None
  SONET alarms   : None
  SONET defects  : None
```

Meaning The first line of the output shows the status of the link. If this line shows that the physical link is up, the physical link is healthy and can pass packets. If this line shows that the physical link is down, the physical link is unhealthy and cannot pass packets.

The controller interface is partitioned into other interface types and appears at the top of a specific level of channelization. For a visual representation of the controller interface at different levels of channelization, see Figure 40 on page 311.

Figure 40: Controller Interfaces at Different Levels of Channelization



Each of the four examples of controller output is for a different level of channelization.

Sample output 1 for interface **coc12-0/0/0** shows **Parent: None**, which indicates the top-most level of channelization.

Sample output 2 for interface **coc1-0/0/0:2** shows **Parent: coc12-0/0/0**,which indicates that this interface is one level down from the top-most level, and is the OC1 controller for a first level of channelization.

Sample output 3 for interface **ct3-0/0/0:5** shows **Parent: coc1-0/0/0:5**, which indicates that this interface is at the second level of channelization, and is a CT3 controller.

Sample output 4 for interface **ct1-0/0/0:4:1** shows **Parent: coc1-0/0/0:4:1**,which indicates that this interface is at the third level of channelization, and is a CT1 controller.

Display the Status of a Specific Channel of a Channelized OC12 IQ Interface

Purpose To display the status of a specific channel of an OC12 IQ interface, use the following Junos OS CLI operational mode command:

Action

```
user@host> show interfaces interface-type-fpc/pic/port:channel
user@host> show interfaces interface-type-fpc/pic/port:channel:channel
user@host> show interfaces interface-type-fpc/pic/port:channel:channel:channel
```

Sample Output 1

```
user@host> show interfaces so-0/0/0:1
Physical interface: so-0/0/0:1, Enabled, Physical link is Up
  Interface index: 197, SNMP ifIndex: 131
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC3,
  Loopback: None, FCS: 16, Payload scrambler: Enabled,
  Parent: coc12-0/0/0   Interface index 195
```

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```
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 17 (00:00:01 ago), Output: 17 (00:00:08 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Not-configured
  CoS queues     : 4 supported
  Last flapped   : 2004-05-26 22:19:18 UTC (00:02:59 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SONET alarms   : None
  SONET defects  : None
  Logical interface so-0/0/0:1.0 (Index 70) (SNMP ifIndex 132)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 20.20.20.0/30, Local: 20.20.20.1, Broadcast: 20.20.20.3
```

Sample Output 2

```
user@host> show interfaces t1-0/0/0:2:1
Physical interface: t1-0/0/0:2:1, Enabled, Physical link is Up
  Interface index: 199, SNMP ifIndex: 133
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-0/0/0:2  Interface index 198
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 44 (00:00:07 ago), Output: 46 (00:00:01 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Not-configured
  CoS queues     : 4 supported
  Last flapped   : Never
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None
  SONET alarms   : None
  SONET defects  : None
  Logical interface t1-0/0/0:2:1.0 (Index 71) (SNMP ifIndex 134)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 20.20.20.4/30, Local: 20.20.20.5, Broadcast: 20.20.20.7
```

Sample Output 3

```
user@host> show interfaces ds-0/0/0:4:1:1
Physical interface: ds-0/0/0:4:1:1, Enabled, Physical link is Up
  Interface index: 231, SNMP ifIndex: 168
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Parent: ct1-0/0/0:4:1  Interface index 230
```


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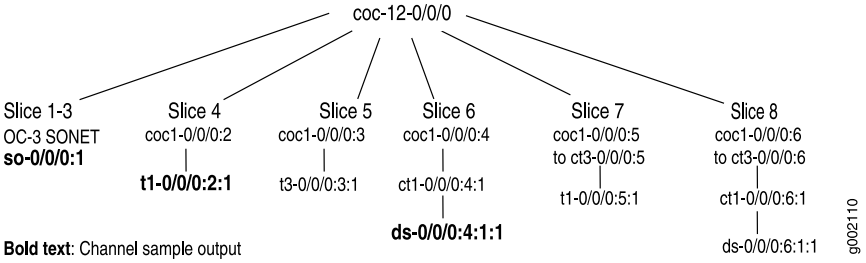
```
Device flags   : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link flags     : Keepalives
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive: Input: 58 (00:00:06 ago), Output: 59 (00:00:01 ago)
LCP state: Opened
NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
CHAP state: Not-configured
CoS queues     : 4 supported
Last flapped   : Never
Input rate     : 48 bps (0 pps)
Output rate    : 48 bps (0 pps)
DS0 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
Logical interface ds-0/0/0:4:1:1.0 (Index 75) (SNMP ifIndex 173)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 20.20.20.12/30, Local: 20.20.20.13, Broadcast: 20.20.20.15
```

Meaning The first line of the output shows the status of the link. If this line shows that the physical link is up, the physical link is healthy and can pass packets. If this line shows that the physical link is down, the physical link is unhealthy and cannot pass packets. All four examples of output show the link is up and can pass packets.

Sample output 1 shows an OC3 SONET interface. Sample output 2 shows a T1 interface that is the result of a partitioned OC1 interface, and sample output 3 shows a DS0 interface that is the result of an OC1 interface partitioned into a T1 interface, which is further partitioned into the DS0 interface.

Figure 41 on page 313 shows a visual representation of the different channel levels.

Figure 41: Specific Channels of a Channelized OC12 IQ Interface



When only one or some individual channels are down, you must troubleshoot the channel by checking the configuration, transmission network, and equipment. If all of the physical layers for the channels are down, you must work with this as a T1, T3, DS0, or OC12 SONET link or PIC problem. For more information on monitoring these types of interfaces, see the respective sections in this guide.

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Display Extensive Status Information for a Channelized OC12 IQ Interface

Purpose To display extensive status information for a Channelized OC12 IQ interface, use the following Junos OS CLI operational mode command:

Action user@host> **show interfaces** ***interface-type-interface-name*** **extensive**

Sample Output 1

The following sample output is for a controller interface:

```
user@host> show interfaces coc12-0/0/0 extensive
Physical interface: coc12-0/0/0, Enabled, Physical link is Up
  Interface index: 138, SNMP ifIndex: 82, Generation: 21
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: OC12,
  Loopback: None, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2004-05-18 21:25:45 UTC (2d 00:04 ago)
  Statistics last cleared: Never
  SONET alarms  : None
  SONET defects : None
  SONET PHY:            Seconds        Count  State
    PLL Lock                  0            0  OK
    PHY Light                 0            0  OK
  SONET section:
    BIP-B1                    0            0
    SEF                      77            1  OK
    LOS                      77            1  OK
    LOF                      77            1  OK
    ES-S                     77
    SES-S                    77
    SEFS-S                   77
  SONET line:
    BIP-B2                    0            0
    REI-L                 82584      1274876
    RDI-L                     5            1  OK
    AIS-L                     0            0  OK
    BERR-SF                  77            1  OK
    BERR-SD                   2            1  OK
    ES-L                     77
    SES-L                    77
    UAS-L                    67
    ES-LFE                82589
    SES-LFE                   5
    UAS-LFE                   0
  Received SONET overhead:
    F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
    S1      : 0x00
  Transmitted SONET overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00
```

Sample Output 2

The following sample output is for a channel on a Channelized OC12 IQ interface:

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```
user@host> show interfaces t1-0/0/0:2:1 extensive
Physical interface: t1-0/0/0:2:1, Enabled, Physical link is Up
  Interface index: 186, SNMP ifIndex: 133, Generation: 69
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-0/0/0:2 Interface index 185
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 444 (last seen 00:00:05 ago)
    Output: 442 (last sent 00:00:09 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Not-configured
  CoS queues     : 4 supported
  Last flapped   : Never
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                10948                    0 bps
   Output bytes  :                11792                    0 bps
   Input  packets:                  892                    0 pps
   Output packets:                  940                    0 pps
  Input errors:
    Errors: 2, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 2, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   3                    3                    0

    1 expedited-fo                  0                    0                    0

    2 assured-forw                  0                    0                    0

    3 network-cont                937                  937                    0

  DS1 alarms : None
  DS1 defects : None
   T1 media:            Seconds        Count  State
    SEF                       1            1  OK
    BEE                       2            2  OK
    AIS                       0            0  OK
    LOF                     108            1  OK
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       1            1
    PCV                       0            0
    CS                        0            0
    LES                     108
    ES                      108
    SES                     108
    SEFS                    108
    BES                       0
```

```
  UAS                    116
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 0
  Timeslots      : All active
  Line encoding: B8ZS, Byte encoding: Nx64K
  Buildout       : 0 to 132 feet
  Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
SONET alarms  : None
SONET defects : None
SONET vt:
  BIP-BIP2                 0           0
  REI-V                   25          25
  LOP-V                   93           1  OK
  AIS-V                    0           0  OK
  RDI-V                    0           0  OK
  UNEQ-V                   0           0  OK
  PLM-V                   93           1  OK
  ES-V                    93
  SES-V                   93
  UAS-V                   83
  ES-VFE                  25
  SES-VFE                 25
  UAS-VFE                  0
Received SONET overhead:
  V5      : 0x02, V5(cmp) : 0x02
Transmitted SONET overhead:
  V5      : 0x02
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)
Logical interface t1-0/0/0:2:1.0 (Index 70) (SNMP ifIndex 134)
(Generation 15)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 24, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 20.20.20.4/30, Local: 20.20.20.5, Broadcast: 20.20.20.7,
      Generation: 29
```

Meaning The sample output shows where the errors might be occurring: either with the channel media or the SONET layer. In this example, there are no errors. However, if errors occur, you must troubleshoot the channel media or the SONET layer. For more information, see the sections of this guide that correspond to the media with which you are working.

Monitor Statistics for a Channelized OC12 IQ Interface

Purpose To monitor statistics for a Channelized OC12 interface, use the following Junos OS CLI operational mode command:

Action user@host> **monitor interfaces** ***interface-type-fpc/pic/port:channel***

Sample Output

```
user@host> monitor interfaces so-0/0/0:1.0
```


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```
host         Seconds: 10                  Time: 00:23:13
                                                          Delay: 0/0/32
Interface: so-0/0/0:1.0, Enabled, Link is Up
Flags: Point-To-Point SNMP-Traps
Encapsulation: PPP
Local statistics:                                         Current delta
  Input bytes:                     431244                         [0]
  Output bytes:                    432268                         [0]
  Input packets:                    35933                         [0]
  Output packets:                   36019                         [0]
Remote statistics:
  Input bytes:                         0 (0 bps)                  [0]
  Output bytes:                        0 (0 bps)                  [0]
  Input packets:                       0 (1 pps)                  [0]
  Output packets:                      0 (0 pps)                  [0]
Traffic statistics:
  Input bytes:                     431244                         [0]
  Output bytes:                    432268                         [0]
  Input packets:                    35933                         [0]
  Output packets:                   36019                         [0]
Protocol: inet, MTU: 4470

user@host> monitor interfaces t1-0/0/0:2:1.0
host         Seconds: 1                   Time: 00:32:07
                                                          Delay: 0/0/26
Interface: t1-0/0/0:2:1.0, Enabled, Link is Up
Flags: Point-To-Point SNMP-Traps
Encapsulation: PPP
Local statistics:                                         Current delta
  Input bytes:                     432028                         [0]
  Output bytes:                    433076                         [0]
  Input packets:                    35954                         [0]
  Output packets:                   36041                         [0]
Remote statistics:
  Input bytes:                         0 (0 bps)                  [0]
  Output bytes:                        0 (0 bps)                  [0]
  Input packets:                       0 (0 pps)                  [0]
  Output packets:                      0 (0 pps)                  [0]
Traffic statistics:
  Input bytes:                     432028                         [0]
  Output bytes:                    433076                         [0]
  Input packets:                    35954                         [0]
  Output packets:                   36041                         [0]
Protocol: inet, MTU: 1500

user@host> monitor interfaces ds-0/0/0:4:1:1.0
host         Seconds: 3                   Time: 00:36:59
                                                           Delay: 0/0/0
Interface: ds-0/0/0:4:1:1.0, Enabled, Link is Up
Flags: Point-To-Point SNMP-Traps
Encapsulation: PPP
Local statistics:                                         Current delta
  Input bytes:                     432836                         [0]
  Output bytes:                    433882                         [0]
  Input packets:                    36065                         [0]
  Output packets:                   36152                         [0]
Remote statistics:
  Input bytes:                         0 (0 bps)                  [0]
  Output bytes:                        0 (0 bps)                  [0]
  Input packets:                       0 (0 pps)                  [0]
  Output packets:                      0 (0 pps)                  [0]
```

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```
Traffic statistics:
  Input bytes:                  432836                          [0]
  Output bytes:                 433882                          [0]
  Input packets:                 36065                          [0]
  Output packets:                36152                          [0]
Protocol: inet, MTU: 1500
```

Meaning The sample output shows common interface failures, indicates whether loopback is detected, and shows increases in framing errors. Use information from this command to help narrow down possible causes of an interface problem.

NOTE: If you are accessing the router from the console connection, make sure you set the CLI terminal type using the **set cli terminal** command.

CAUTION: We recommend that you use this command only for diagnostic purposes. Do not leave it on during normal router operations because real-time monitoring of traffic consumes additional CPU and memory resources.

Related Documentation

- *Channelized Interfaces Feature Guide for Routing Devices*

Using Loopback Testing for Channelized OC12 Interfaces

- Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces on page 318
- Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface on page 320
- Create a Loopback on page 320
- Verify That the Interface Is Up on page 322
- Clear Interface Statistics on page 324
- Force the Link Layer to Stay Up on page 325
- Verify the Status of the Logical Interface on page 326
- Ping the Channelized Interface on page 327
- Check for Interface Error Statistics on page 328
- Diagnose a Suspected Circuit Problem on page 331

Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces

Purpose To use loopback testing to isolate Channelized OC12 and Channelized OC12 IQ interface problems. The naming convention for the Channelized OC12 IQ interface varies depending on the type of interface.

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Action Table 37 on page 319 provides links and commands for using loopback testing to isolate Channelized OC12 and Channelized OC12 IQ interface problems.

Table 37: Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces

Tasks	Command or Action
"Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface" on page 320	
1. Create a Loopback on page 320	
a. Create a Physical Loopback on page 320	Connect the TX port to the RX port.
b. Configure a Local Loopback on page 321	[edit interfaces t3-*fpc/pic/port:channel* t3 options] set loopback local show commit
2. Verify That the Interface Is Up on page 322	show interfaces t3-*fpc/pic/port:channel* extensive
3. Clear Interface Statistics on page 324	clear interfaces statistics t3-*fpc/pic/port:channel*
4. Force the Link Layer to Stay Up on page 325	
a. Configure Encapsulation to Cisco-HDLC on page 325	[edit interfaces t3-*fpc/pic/port:channel*] set encapsulation cisco-hdlc show commit
b. Configure No-Keepalives on page 326	[edit interfaces t3-*fpc/pic/port:channel*] set no-keepalives show commit
5. Verify the Status of the Logical Interface on page 326	show interfaces t3-*fpc/pic/port:channel*
6. Ping the Channelized Interface on page 327	ping interface t3-*fpc/pic/port:channel local-IP-address* bypass-routing count 1000 rapid
7. Check for Interface Error Statistics on page 328	show interfaces t3-*fpc/pic/port:channel* extensive
"Diagnose a Suspected Circuit Problem" on page 331	
1. Loop the Entire T3 Interface Toward the Network on page 331	[edit interfaces t3-*fpc/pic/port:channel* t3-options] set loopback remote show commit
2. Create a Loop to the Router from Various Points in the Network on page 332	Perform Steps 2 through 8 from "Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface" on page 320.

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Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface

Problem **Description:** To diagnose a suspected hardware problem with a Channelized OC12 or Channelized OC12 IQ interface, follow these steps:

Solution

- Create a Loopback on page 320
- Verify That the Interface Is Up on page 322
- Clear Interface Statistics on page 324
- Force the Link Layer to Stay Up on page 325
- Verify the Status of the Logical Interface on page 326
- Ping the Channelized Interface on page 327
- Check for Interface Error Statistics on page 328

Create a Loopback

Purpose

You can create a physical loopback or configure a local loopback to help diagnose a suspected hardware problem. Creating a physical loopback is recommended because it allows you to test and verify the Channelized OC12 or Channelized OC12 IQ port. If a field engineer is not available to create the physical loopback, you can configure a local loopback for the interface. The local loopback creates a loopback internally in the Physical Interface Card (PIC).

NOTE: For a list of interface types associated with the Channelized OC12 IQ interface, see the *Junos OS Network Interfaces Library for Routing Devices*.

1. Create a Physical Loopback on page 320
2. Configure a Local Loopback on page 321

Create a Physical Loopback

Action

To create a physical loopback at the port, connect the transmit port to the receive port.

Meaning

When you create and test a physical loopback, you are testing the transmit and receive ports of the PIC. This action is recommended if a field engineer is available to create the physical loop as it provides a more complete test of the PIC.

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Configure a Local Loopback

Action

To configure a local loopback, follow these steps:

NOTE: For a list of interface types associated with the Channelized OC12 IQ interface, see the *Junos Network Interfaces Configuration Guide*.

1. In configuration mode, go to the following hierarchy level:

   ```
   [edit]
   user@host#  edit interfaces t3-fpc/pic/port:channel  t3-options
   ```

2. Configure the local loopback:

   ```
   [edit interfaces t3-fpc/pic/port:channel t3-options]
   user@host# set loopback local
   ```

   The following is an example of the name for a T3 channel on a channelized DS3 interface:

   ```
   [edit interfaces t3-2/1/0:2 t3-options]
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t3-2/1/0:2 t3-options]
   user@host# show
   loopback local;
   ```

4. Commit the configuration:

   ```
   user@host# commit
   ```

   For example:

   ```
   [edit interfaces t3-2/1/1:2 t3-options]
   user@host# commit
   commit complete
   ```

Meaning

When you create a local loopback, you create an internal loop on the interface being tested. A local loopback loops the traffic internally on that PIC. A local loopback tests the interconnection of the PIC but does not test the transmit and receive ports.

NOTE: Remember to delete the loopback statement after completing the test.

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Verify That the Interface Is Up

Purpose Display the status of a Channelized OC12 or Channelized OC12 IQ interface to determine whether the physical link is up or down.

Action To verify that the status of the Channelized OC12 or Channelized OC12 IQ interface is up, use the following Junos OS command-line interface (CLI) operational mode command:

user@host> **show interfaces t3-*fpc/pic/port:channel* extensive**.

NOTE: For a list of interface types associated with the Channelized OC12 IQ interface, see *Junos Network Interfaces Configuration Guide*.

Sample Output

```
user@host> show interfaces t3-0/3/0:0 extensive
Physical interface: t3-0/3/0:0, Enabled, Physical link is Up
  Interface index: 193, SNMP ifIndex: 118, Generation: 122
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: T3,
  Loopback: Local, SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2004-05-21 15:23:34 UTC (00:05:00 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                    0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Bucket drops: 0, Policed discards:
0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  DS3  alarms  : None
  SONET alarms  : None
  DS3  defects : None
  SONET defects : None
  DS3 media:            Seconds        Count  State
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CCV                       0            0
    LES                       0
    PES                       0
```


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```
  PSES                    0
  CES                     0
  CSES                    0
  SEFS                    0
  UAS                     0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 4484, Runt threshold: 3
  Idle cycle flag: flags, Start end flag: shared
DSU configuration:
  Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
  FEAC loopback: Inactive, Response: Disabled, Count: 0
DS-3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
Interface transmit queues:
                B/W  WRR       Packets        Bytes
  Queue0          0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
  Queue1          0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
  Queue2          0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
  Queue3          0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
SONET PHY:           Seconds        Count  State
  PLL Lock                 0            0  OK
  PHY Light                0            0  OK
SONET section:
  BIP-B1                   1           22
  SEF                      0            0  OK
  LOS                      0            0  OK
  LOF                      0            0  OK
  ES-S                     1
  SES-S                    0
  SEFS-S                   0
SONET line:
  BIP-B2                   1          307
  REI-L                    0            0
  RDI-L                    3            1  OK
  AIS-L                    0            0  OK
  BERR-SF                  0            0  OK
  BERR-SD                  0            0  OK
  ES-L                     1
  SES-L                    0
  UAS-L                    0
  ES-LFE                   3
  SES-LFE                  3
  UAS-LFE                  0
SONET path:
  BIP-B3                   1           35
  REI-P                    1            7
```

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```
  LOP-P                     0           0  OK
  AIS-P                     0           0  OK
  RDI-P                     0           0  OK
  UNEQ-P                    0           0  OK
  PLM-P                     1           1  OK
  ES-P                      1
  SES-P                     0
  UAS-P                     0
  ES-PFE                    1
  SES-PFE                   0
  UAS-PFE                   0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
Received path trace: t3-0/1/0:0
  74 33 2d 30 2f 31 2f 30 3a 30 00 00 00 00 0d 0a   t3-0/1/0:0......
Transmitted path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 00 00   t3-0/3/0:0......
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 1 (0x00)
  CoS transmit queue             Bandwidth           Buffer Priority   Limit
                              %          bps   %        bytes
  0 best-effort              95     42499200  95            0      low    none
  3 network-control           5      2236800   5            0      low    none
```

Meaning

The sample output shows that the physical link is up and there are no OC12 alarms or defects. You should not see any OC12 alarms.

Clear Interface Statistics

Purpose

You must reset the Channelized OC12 or Channelized OC12 IQ interface statistics before initiating the ping test. Resetting the statistics provides a clean start so that previous input or output errors and packet statistics do not interfere with the current efforts to diagnose the problem.

Action

To clear all statistics for the interface, use the following Junos OS CLI operational mode command:

user@host> **clear interfaces statistics t3-*fpc/pic/port:channel***.

Sample Output

```
user@host> clear interfaces statistics t3-1/1/0:0
user@host>
```


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Meaning

This command clears the interface statistics counters for the Channelized OC12 interface only.

NOTE: After a Graceful Routing Engine switchover (GRES) you must run **clear interface statistics** again or interface statistics will display junk vales.

Force the Link Layer to Stay Up

Purpose

To complete the loopback test, the link layer must remain up. However, Junos OS is designed to recognize that loop connections are not valid connections and to bring the link layer down. You need to force the link layer to stay up by making some configuration changes to the encapsulation and keepalives.

Force the link layer to stay up, follow these steps:

1. Configure Encapsulation to Cisco-HDLC on page 325
2. Configure No-Keepalives on page 326

Configure Encapsulation to Cisco-HDLC

Action

To set the encapsulation on a T3 physical interface, follow these steps:

1. In configuration mode, go to the following hierarchy level:

   ```
   [edit]
   user@host# edit interfaces t3-fpc/pic/port:channel
   ```

2. Configure Cisco-HDLC:

   ```
   [edit interfaces t3-fpc/pic /port:channel ]
   user@host# set encapsulation cisco-hdlc
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t3-0/1/1:8]
   user@host# show
   encapsulation hdlc;
   ```

4. Commit the change:

   ```
   user@host# commit
   ```

   For example:

   ```
   [edit interfaces t3-0/1/1:8]
   user@host# commit
   commit complete
   ```

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Meaning

This command sets the interface encapsulation to the Cisco High-level Data-Link Control (HDLC) transport protocol.

Configure No-Keepalives

Action

To disable the sending of link-layer keepalives on a Channelized OC12 or Channelized OC12 IQ interface, follow these steps:

NOTE: For a list of interface types associated with the Channelized OC12 IQ interface, see *Junos Network Interfaces Configuration Guide*.

1. In configuration mode, go to the following hierarchy level:

   ```
   [edit]
   user@host# edit interfaces t3-fpc/pic/port:channel
   ```

2. Configure no-keepalives:

   ```
   [edit interfaces t3-fpc/pic/port:channel]
   user@host# set no-keepalives
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t3-0/1/1:8]
   user@host# show
   no-keepalives;
   ```

4. Commit the change:

   ```
   user@host# commit
   ```

   For example:

   ```
   [edit interfaces t3-0/1/1:8]
   user@host# commit
   commit complete
   ```

Meaning

By setting no-keepalives, the link layer is forced to stay up. If the setting remains at keepalive, the router will recognize that the same link-layer keepalives are being looped back and will bring the link layer down.

Verify the Status of the Logical Interface

Purpose To verify the status of the logical interface, use the following Junos OS CLI operational mode command:

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Action user@host> **show interfaces t3-*fpc/pic/port:channel***.

NOTE: For a list of interface types associated with the Channelized OC12 IQ interface, see *Junos Network Interfaces Configuration Guide*.

Sample Output

```
user@host> show interfaces t3-0/3/0:11
Physical interface: t3-0/3/0:11, Enabled, Physical link is Up
  Interface index: 204, SNMP ifIndex: 129
  Link-level type: Cisco-HDLC, MTU: 4474, SONET mode, Speed: T3, Loopback: Local,

  SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : No-Keepalives
  CoS queues     : 4 supported
  Last flapped   : 2004-05-21 15:23:34 UTC (01:34:24 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS3 alarms : None
  SONET alarms : None
  DS3 defects : None
  SONET defects : None
  DS-3 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Algorithm: Unknown (0), Induced error rate: 10e-0
   Logical interface t3-0/3/0:11.0 (Index 71) (SNMP ifIndex 130)
     Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 4470
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.0.0.0/30, Local: 10.0.0.1, Broadcast: 10.0.0.3
```

Meaning The sample output shows that the channelized interface has the physical and logical links up. There are no alarms or defects.

Ping the Channelized Interface

Purpose Use the ping command to verify the loopback connection.

Action To ping the local interface, use the following Junos OS CLI operational mode command:

user@host> **ping interface t3-*fpc/pic/port:channel local-IP-address* bypass-routing count 1000 rapid**.

NOTE: For a list of interface types associated with the Channelized OC12 IQ interface, see the *Junos Network Interfaces Configuration Guide*.

Sample Output

```
user@host> ping interface t3-0/3/0:11 10.0.0.1 bypass-routing count 1000 rapid
```

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```
PING 10.0.0.1 (10.0.0.1): 56 data bytes
!!!
```

```
  HS link CRC errors: 0, SRAM errors: 0
 Output errors:
  Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
DS3 alarms : None
SONET alarms : None
DS3 defects : None
SONET defects : None
DS3 media:            Seconds        Count  State
  AIS                       0            0  OK
  LOF                       0            0  OK
  LOS                       0            0  OK
  IDLE                      0            0  OK
  YELLOW                    0            0  OK
  BPV                       0            0
  EXZ                       0            0
  LCV                       0            0
  PCV                       0            0
  CCV                       0            0
  LES                       0
  PES                       0
  PSES                      0
  CES                       0
  CSES                      0
  SEFS                      0
  UAS                       0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 4484, Runt threshold: 3
  Idle cycle flag: flags, Start end flag: shared
DSU configuration:
  Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
  FEAC loopback: Inactive, Response: Disabled, Count: 0
DS-3 BERT configuration:
  BERT time period: 0 seconds, Elapsed: 0 seconds
  Algorithm: Unknown (0), Induced error rate: 10e-0
Interface transmit queues:
                 B/W  WRR       Packets        Bytes
  Queue0           0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
  Queue1           0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
  Queue2           0    0
    Transmitted:                     0            0
    Drops:                           0            0
    Errors:                          0
  Queue3           0    0
    Transmitted:                  1669       109318
    Drops:                           0            0
    Errors:                          0
SONET PHY:            Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                 0            0  OK
SONET section:
  BIP-B1                    1           22
  SEF                       0            0  OK
  LOS                       0            0  OK
```

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```
    LOF                       0            0  OK
    ES-S                      1
    SES-S                     0
    SEFS-S                    0
  SONET line:
    BIP-B2                    1          307
    REI-L                     0            0
    RDI-L                     3            1  OK
    AIS-L                     0            0  OK
    BERR-SF                   0            0  OK
    BERR-SD                   0            0  OK
    ES-L                      1
    SES-L                     0
    UAS-L                     0
    ES-LFE                    3
    SES-LFE                   3
    UAS-LFE                   0
  SONET path:
    BIP-B3                    1           37
    REI-P                     1           23
    LOP-P                     0            0  OK
    AIS-P                     0            0  OK
    RDI-P                     0            0  OK
    UNEQ-P                    0            0  OK
    PLM-P                     1            1  OK
    ES-P                      1
    SES-P                     0
    UAS-P                     0
    ES-PFE                    1
    SES-PFE                   0
    UAS-PFE                   0
  Received SONET overhead:
    F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
    S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
    Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
  Transmitted SONET overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
    Z4      : 0x00
  Received path trace: t3-0/1/0:11
    74 33 2d 30 2f 31 2f 30 3a 31 31 00 00 00 0d 0a   t3-0/1/0:11.....
  Transmitted path trace: t3-0/3/0:11
    74 33 2d 30 2f 33 2f 30 3a 31 31 00 00 00 00 00   t3-0/3/0:11.....
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 1 (0x02)
    CoS transmit queue             Bandwidth           Buffer Priority   Limit
                              %          bps   %        bytes
    0 best-effort            95     42499200  95            0      low    none
    3 network-control         5      2236800   5            0      low    none
  Logical interface t3-0/3/0:11.0 (Index 71) (SNMP ifIndex 130) (Generation 22)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 4470, Generation: 31, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
       Destination: 10.0.0.0/30, Local: 10.0.0.1, Broadcast: 10.0.0.3, Generation:
43
```

Meaning Check for any error statistics that may appear in the output. There should not be any input or output errors. If there are any persistent input or output errors, open a case with

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JTAC at **support@juniper.net**, or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

Diagnose a Suspected Circuit Problem

Purpose

When you suspect a circuit problem, it is important to work with the transport-layer engineer to resolve the problem. The transport-layer engineer may ask you to create a loop from the router to the network, or the engineer may create a loop to the router from various points in the network.

To diagnose a suspected circuit problem, follow these steps:

1. Loop the Entire T3 Interface Toward the Network on page 331
2. Create a Loop to the Router from Various Points in the Network on page 332

Loop the Entire T3 Interface Toward the Network

Purpose

Creating a loop from the entire T3 interface to the network allows the transport-layer engineer to test the router from various points in the network and isolate the problem..

NOTE: For a list of interface types associated with the Channelized OC12 IQ interface, see the *Junos Network Interfaces Configuration Guide*.

Action

To create a loop from the entire T3 interface to the network, follow these steps:

1. In configuration mode, go to the following hierarchy level:

   ```
   [edit]
   user@host# edit interfaces t3-fpc/pic/port:channel t3-options
   ```

2. Configure the loopback:

   ```
   [edit interfaces t3-fpc/pic/port:channel t3-options]
   user@host# set loopback remote
   ```

3. Verify the configuration:

   ```
   user@host# show
   ```

   For example:

   ```
   [edit interfaces t3-2/1/1:0 t3-options]
   user@host# show
   loopback remote;
   ```

4. Commit the configuration:

   ```
   user@host# commit
   ```

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Meaning

The **loopback remote** command loops any traffic from the network back into the network.

Create a Loop to the Router from Various Points in the Network

Purpose

The transport-layer engineer creates a loop to the router from various points in the network. You can then perform tests to verify the connection from the router to that loopback in the network.

Action

After the transport-layer engineer has created the loop to the router from the network, you must verify the connection from the router to the loopback in the network. Follow Steps 2 through 7 in "Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface" on page 320. Keep in mind that any problems encountered in the test indicate a problem with the connection from the router to the loopback in the network.

By performing tests to loopbacks at various points in the network, you can isolate the source of the problem.

Related Documentation

- *Channelized Interfaces Feature Guide for Routing Devices*

Locating Channelized OC12 Alarms and Errors

- Checklist for Channelized OC12 Alarms and Errors on page 332
- Display Channelized OC12 Alarms and Errors on page 333
- Display Channelized OC12 IQ Alarms and Errors on page 336

Checklist for Channelized OC12 Alarms and Errors

Purpose To check the most common Channelized OC12 alarms and errors encountered when investigating line problems on a Juniper Networks router.

Action Table 38 on page 332 provides links and commands for Channelized OC12 alarms and errors.

Table 38: Checklist for Channelized OC12 Alarms and Errors

Tasks	Command or Action
"Display Channelized OC12 Alarms and Errors" on page 333	show interfaces t3-*fpc/pic/port:channel* extensive
"Display Channelized OC12 IQ Alarms and Errors" on page 336	show interfaces *interface-type-interface-name* extensive

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Display Channelized OC12 Alarms and Errors

Purpose To display Channelized OC12 interface alarms and errors, use the following Junos OS command-line interface (CLI) operational mode command:

Action user@host> **show interfacest3-*fpc/pic/port*:*channel* extensive**

Sample Output 1

```
user@host> show interfaces t3-0/3/0:0 extensive
Physical interface: t3-0/3/0:0, Enabled, Physical link is Up
  Interface index: 193, SNMP ifIndex: 118, Generation: 122
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: T3,
  Loopback: Local, SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2004-05-21 15:23:34 UTC (01:59:02 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Bucket drops: 0, Policed discards:
0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  DS3 alarms : None
  SONET alarms : None
  DS3 defects : None
  SONET defects : None
  DS3 media:            Seconds        Count  State
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CCV                       0            0
    LES                       0
    PES                       0
    PSES                      0
    CES                       0
    CSES                      0
    SEFS                      0
    UAS                       0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 4484, Runt threshold: 3
    Idle cycle flag: flags, Start end flag: shared
```

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```
DSU configuration:
  Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
  FEAC loopback: Inactive, Response: Disabled, Count: 0
DS-3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^3 - 1, Pseudorandom (1), Induced error rate: 10e-0
Interface transmit queues:
                 B/W  WRR       Packets        Bytes
  Queue0           0    0
    Transmitted:                      0            0
    Drops:                            0            0
    Errors:                           0
  Queue1           0    0
    Transmitted:                      0            0
    Drops:                            0            0
    Errors:                           0
  Queue2           0    0
    Transmitted:                      0            0
    Drops:                            0            0
    Errors:                           0
  Queue3           0    0
    Transmitted:                      0            0
    Drops:                            0            0
    Errors:                           0
SONET PHY:            Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                 0            0  OK
SONET section:
  BIP-B1                    1           22
  SEF                       0            0  OK
  LOS                       0            0  OK
  LOF                       0            0  OK
  ES-S                      1
  SES-S                     0
  SEFS-S                    0
SONET line:
  BIP-B2                    1          307
  REI-L                     0            0
  RDI-L                     3            1  OK
  AIS-L                     0            0  OK
  BERR-SF                   0            0  OK
  BERR-SD                   0            0  OK
  ES-L                      1
  SES-L                     0
  UAS-L                     0
  ES-LFE                    3
  SES-LFE                   3
  UAS-LFE                   0
SONET path:
  BIP-B3                    1           35
  REI-P                     1            7
  LOP-P                     0            0  OK
  AIS-P                     0            0  OK
  RDI-P                     0            0  OK
  UNEQ-P                    0            0  OK
  PLM-P                     1            1  OK
  ES-P                      1
  SES-P                     0
  UAS-P                     0
  ES-PFE                    1
  SES-PFE                   0
```


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```
  UAS-PFE                  0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
Received path trace: t3-0/1/0:0
  74 33 2d 30 2f 31 2f 30 3a 30 00 00 00 00 0d 0a   t3-0/1/0:0......
Transmitted path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 00 00   t3-0/3/0:0......
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 1 (0x00)
  CoS transmit queue             Bandwidth            Buffer Priority   Limit
                            %          bps   %         bytes
  0 best-effort            95     42499200  95             0      low    none
  3 network-control         5      2236800   5             0      low    none
```

Meaning The sample output shows that there are no active alarms or active defects, either with the T3 media or the SONET layer. If alarms or errors occur, you must troubleshoot the T3 media or the SONET layer. For more information on diagnosing a T3 media problem or a SONET layer problem, see the topics in the Related Topics section.

When a major error (such as an alarm indication signal [AIS]) is seen for a few consecutive frames, a defect is declared within 1 second from detection. At the defect level, the interface is taken down and routing protocols are immediately notified (this is the default). In most cases, when a defect persists for 2.5 seconds plus or minus 0.5 seconds, an alarm is declared.

Notification messages are logged at the alarm level. Depending on the type of T3 alarm, you can configure the craft panel to display the red or yellow alarm LED and simultaneously have the alarm relay activate a physically connected device (such as a bell).

NOTE: T3 is a general term used to refer to the transmission of 44.736-Mbps digital circuits over any media. T3 can be transported over copper, fiber, or radio. DS3 is the term for the electrical signal found at the metallic interface for this circuit where most of the testing is performed.

Table 39 on page 335 shows T3 media-specific alarms or errors that can render the interface unable to pass packets.

Table 39: T3 Interface Error Counter Definitions

T3 Alarm or Error	Definition
AIS	Alarm indication signal
EXZ	Excessive zeros

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Table 39: T3 Interface Error Counter Definitions *(continued)*

T3 Alarm or Error	Definition
FERF	Far-end failures
IDLE	Idle code detected
LCV	Line code violation
LOS	Loss of signal
LOF	Loss of frame
YLW	Remote defect indication (yellow alarm)
PLL	Phase locked loop

For more details on T3 alarms and statistics, see *Checklist of Common T3 Alarms and Errors*.

Display Channelized OC12 IQ Alarms and Errors

Purpose To display Channelized OC12 IQ interface alarms and errors, use the following Junos OS CLI operational mode command:

Action user@host> **show interfaces** ***interface-type-interface-name*** **extensive**

Sample Output 1

The following sample output is for a controller interface:

```
user@host> show interfaces coc12-0/0/0 extensive
Physical interface: coc12-0/0/0, Enabled, Physical link is Up
  Interface index: 138, SNMP ifIndex: 82, Generation: 21
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: OC12,
  Loopback: None, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2004-05-18 21:25:45 UTC (2d 00:04 ago)
  Statistics last cleared: Never
  SONET alarms  : None
  SONET defects : None
  SONET PHY:            Seconds        Count  State
    PLL Lock                  0            0  OK
    PHY Light                 0            0  OK
  SONET section:
    BIP-B1                    0            0
    SEF                      77            1  OK
    LOS                      77            1  OK
    LOF                      77            1  OK
```


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```
    ES-S                    77
    SES-S                   77
    SEFS-S                  77
  SONET line:
    BIP-B2                   0           0
    REI-L                82584      1274876
    RDI-L                    5           1  OK
    AIS-L                    0           0  OK
    BERR-SF                 77           1  OK
    BERR-SD                  2           1  OK
    ES-L                    77
    SES-L                   77
    UAS-L                   67
    ES-LFE               82589
    SES-LFE                  5
    UAS-LFE                  0
  Received SONET overhead:
    F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
    S1      : 0x00
  Transmitted SONET overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00
```

Sample Output 2

The following sample output is for a T1 channel on a Channelized OC12 IQ interface:

```
user@host> show interfaces t1-0/0/0:2:1 extensive
Physical interface: t1-0/0/0:2:1, Enabled, Physical link is Up
  Interface index: 186, SNMP ifIndex: 133, Generation: 69
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-0/0/0:2 Interface index 185
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 444 (last seen 00:00:05 ago)
    Output: 442 (last sent 00:00:09 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Not-configured
  CoS queues     : 4 supported
  Last flapped   : Never
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                10948                    0 bps
   Output bytes  :                11792                    0 bps
   Input  packets:                  892                    0 pps
   Output packets:                  940                    0 pps
  Input errors:
    Errors: 2, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 2, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets
```

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```
  0 best-effort                 3                 3                 0

  1 expedited-fo                0                 0                 0

  2 assured-forw                0                 0                 0

  3 network-cont              937               937                 0

DS1 alarms : None
DS1 defects : None
 T1 media:              Seconds        Count  State
  SEF                         1            1  OK
  BEE                         2            2  OK
  AIS                         0            0  OK
  LOF                       108            1  OK
  LOS                         0            0  OK
  YELLOW                      0            0  OK
  BPV                         0            0
  EXZ                         0            0
  LCV                         1            1
  PCV                         0            0
  CS                          0            0
  LES                       108
  ES                        108
  SES                       108
  SEFS                      108
  BES                         0
  UAS                       116
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 0
  Timeslots      : All active
  Line encoding: B8ZS, Byte encoding: Nx64K
  Buildout       : 0 to 132 feet
  Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
SONET alarms : None
SONET defects : None
SONET vt:
  BIP-BIP2                    0            0
  REI-V                      25           25
  LOP-V                      93            1  OK
  AIS-V                       0            0  OK
  RDI-V                       0            0  OK
  UNEQ-V                      0            0  OK
  PLM-V                      93            1  OK
  ES-V                       93
  SES-V                      93
  UAS-V                      83
  ES-VFE                     25
  SES-VFE                    25
  UAS-VFE                     0
Received SONET overhead:
  V5      : 0x02, V5(cmp) : 0x02
Transmitted SONET overhead:
  V5      : 0x02
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)
```


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```
Logical interface t1-0/0/0:2:1.0 (Index 70) (SNMP ifIndex 134)
(Generation 15)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 24, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 20.20.20.4/30, Local: 20.20.20.5, Broadcast: 20.20.20.7,
      Generation: 29
```

Meaning The sample output shows that there are no active alarms or active defects. If alarms or errors occur, you must troubleshoot the channel media or the SONET layer. For more information, see the topics that correspond to the media with which you are working.

When a major error (such as an AIS) is seen for a few consecutive frames, a defect is declared within 1 second from detection. At the defect level, the interface is taken down and routing protocols are immediately notified (this is the default). In most cases, when a defect persists for 2.5 seconds plus or minus 0.5 seconds, an alarm is declared.

Related Documentation

- *Channelized Interfaces Feature Guide for Routing Devices*

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PART 4

Configuration Statements and Operational Commands

- Configuration Statements on page 343
- Operational Commands on page 443

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CHAPTER 15

Configuration Statements

- [edit chassis] Hierarchy Level on page 345
- [edit interfaces] Hierarchy Level on page 346
- [edit logical-systems] Hierarchy Level on page 362
- address on page 367
- advertise-interval on page 369
- aps on page 370
- authentication-key on page 371
- bchannel-allocation on page 371
- bert-algorithm on page 372
- bert-error-rate on page 374
- bert-period on page 376
- byte-encoding on page 377
- bytes on page 378
- cbit-parity on page 379
- channelization on page 379
- clocking on page 380
- data-input on page 381
- dlci on page 382
- e1-options on page 383
- encapsulation (Logical Interface) on page 384
- encapsulation (Physical Interface) on page 388
- family on page 393
- fast-aps-switch on page 397
- fcs on page 398
- feac-loop-respond on page 399
- force on page 400
- framing (E1, E3, and T1 Interfaces) on page 401
- hold-time (APS) on page 402

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- idle-cycle-flag on page 403
- interface-type (Interfaces) on page 404
- inverse-arp on page 405
- invert-data on page 406
- isdn-options on page 407
- lmi-type on page 408
- lockout on page 408
- loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) on page 409
- mtu on page 411
- multicast-dlci on page 413
- multipoint-destination on page 414
- neighbor (Automatic Protection Switching for SONET/SDH) on page 415
- no-keepalives on page 416
- no-partition on page 417
- no-termination-request on page 418
- oc-slice on page 419
- paired-group on page 419
- partition on page 420
- protect-circuit on page 421
- request on page 421
- revert-time (Interfaces) on page 422
- sonet-options on page 423
- start-end-flag on page 425
- switching-mode on page 426
- t1-options on page 427
- t3-options on page 428
- timeslots on page 429
- translate-discard-eligible on page 430
- unit on page 431
- vtmapping on page 437
- working-circuit on page 437
- line-encoding on page 438
- start-end-flag on page 439
- ds0-options on page 440
- long-buildout on page 441
- start-end-flag on page 442

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[edit chassis] Hierarchy Level

```
chassis {
  aggregated-devices {
    ethernet {
      device-count number;
    }
    sonet {
      device-count number;
    }
  }
    maximum-links {
    }
  channel-group number {
    ethernet {
      device-count number;
    }
    fpc slot-number{
      pic pic-number {
        adaptive-services{
          service-package (layer-2 | layer-3);
        }
        aggregate-ports;
        atm-cell-relay-accumulation;
        atm-l2circuit-mode (aal5 | cell | trunk trunk);
        ce1 {
          e1 link-number {
            channel-group group-number;
            timeslots time-slot-range;
          }
        }
        channelization;
        ct1 {
          t1 link-number {
            channel-group group-number;
            timeslots time-slot-range;
          }
        }
        ct3 {
          port port-number {
            t1 link-number {
              channel-group group-number;
              timeslots time-slot-range;
            }
          }
          framing sdh;
        }
        max-queues-per-interface number;
        mlfr-uni-nni-bundles num-intf;
        no-concatenate;
        shdsl {
          pic-mode (1-port-atm | 2-port-atm);
        }
        vtmapping (klm | itu-t);
```

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```
    }
  }
  fpc slot-number{
  pic pic-number{
    account-layer2-overhead
      egress-policer-overhead bytes;
      ingress-policer-overhead bytes;
      mlfr-uni-nni-bundles-inline number;
      multi-link-layer-2-inline;
    }
  }
}
```

Related Documentation

- *Interfaces Fundamentals for Routing Devices*

[edit interfaces] Hierarchy Level

The statements at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level can also be configured at the **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]** hierarchy level.

NOTE: The *accounting-profile* statement is an exception to this rule. The **accounting-profile** statement can be configured at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level, but it cannot be configured at the **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]** hierarchy level.

```
interfaces {
  traceoptions {
    file filename <files number> <match regular-expression> <size size> <world-readable |
      no-world-readable> ;
    flag flag <disable>;
  }
  interface-name {
    accounting-profile name;
    aggregated-ether-options {
      (flow-control | no-flow-control);
      lacp {
        (active | passive);
        link-protection {
          disable;
        (revertive | non-revertive);
        periodic interval;
        system-priority priority;
      }
      link-protection;
      link-speed speed;
      (loopback | no-loopback);
      mc-ae{
        chassis-id chassis-id;
        mc-ae-id mc-ae-id;
```


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```
      mode (active-active | active-standby);
      redundancy-group group-id;
      status-control (active | standby);
    }
    minimum-links number;
    source-address-filter {
      mac-address;
    }
    (source-filtering | no-source-filtering);
  }
  shared-scheduler;
  aggregated-sonet-options {
    link-speed speed | mixed;
    minimum-links number;
  }
  atm-options {
    cell-bundle-size cells;
    ilmi;
    linear-red-profiles profile-name {
      high-plp-max-threshold percent;
      low-plp-max-threshold percent;
      queue-depth cells high-plp-threshold percent low-plp-threshold percent;
    }
    mpls {
      pop-all-labels {
        required-depth number;
      }
    }
    pic-type (atm1 | atm2);
    plp-to-clp;
    promiscuous-mode {
      vpi vpi-identifier;
    }
    scheduler-maps map-name {
      forwarding-class class-name {
        epd-threshold cells plp1 cells;
        linear-red-profile profile-name;
        priority (high | low);
        transmit-weight (cells number | percent number);
      }
      vc-cos-mode (alternate | strict);
    }
    use-null-cw;
      vpi vpi-identifier {
      maximum-vcs maximum-vcs;
      oam-liveness {
        down-count cells;
        up-count cells;
      }
      oam-period (seconds | disable);
      shaping {
        (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
          burst length);
        queue-length number;
      }
    }
```

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```
}
clocking clock-source;
damping {
   enable;
   half-life seconds;
   max-suppress seconds;
   reuse number;
   suppress number;
}
data-input (system | interface interface-name);
dce;
serial-options {
   clock-rate rate;
   clocking-mode (dce | internal | loop);
   control-polarity (negative | positive);
   cts-polarity (negative | positive);
   dcd-polarity (negative | positive);
   dce-options {
      control-signal (assert | de-assert | normal);
      cts (ignore | normal | require);
      dcd (ignore | normal | require);
      dsr (ignore | normal | require);
      dtr signal-handling-option;
      ignore-all;
      indication (ignore | normal | require);
      rts (assert | de-assert | normal);
      tm (ignore | normal | require);
   }
   dsr-polarity (negative | positive);
   dte-options {
      control-signal (assert | de-assert | normal);
      cts (ignore | normal | require);
      dcd (ignore | normal | require);
      dsr (ignore | normal | require);
      dtr signal-handling-option;
      ignore-all;
      indication (ignore | normal | require);
      rts (assert | de-assert | normal);
      tm (ignore | normal | require);
   }
   dtr-circuit (balanced | unbalanced);
   dtr-polarity (negative | positive);
   encoding (nrz | nrzi);
   indication-polarity (negative | positive);
   line-protocol protocol;
   loopback mode;
   rts-polarity (negative | positive);
   tm-polarity (negative | positive);
   transmit-clock invert;
}
description text;
alias alias-name;
dialer-options {
   pool pool-name <priority priority>;
}
disable;
```


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```
ds0-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  byte-encoding (nx56 | nx64);
  fcs (16 | 32);
  idle-cycle-flag (flags | ones);
  invert-data;
  loopback payload;
  start-end-flag (filler | shared);
}
e1-options {
  bert-error-rate rate;
  bert-period seconds;
  fcs (16 | 32);
  framing (g704 | g704-no-crc4 | unframed);
  idle-cycle-flag (flags | ones);
  invert-data;
  loopback (local | remote);
  start-end-flag (filler | shared);
  timeslots time-slot-range;
}
e3-options {
  atm-encapsulation (direct | plcp);
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  framing feet;
  compatibility-mode (digital-link | kentrox | larscom) <subrate value>;
  fcs (16 | 32);
  framing (g.751 | g.832);
  idle-cycle-flag (filler | shared);
  invert-data;
  loopback (local | remote);
  (payload-scrambler | no-payload-scrambler);
  start-end-flag (filler | shared);
  (unframed | no-unframed);
}
encapsulation type;
es-options {
  backup-interface es-fpc/pic/port;
}
fastether-options {
  802.3ad aex;
  (flow-control | no-flow-control);
  ignore-l3-incompletes;
  ingress-rate-limit rate;
  (loopback | no-loopback);
  mpls {
    pop-all-labels {
      required-depth number;
    }
  }
  source-address-filter {
    mac-address;
  }
```

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```
    (source-filtering | no-source-filtering);
  }
  flexible-vlan-tagging;
  gigether-options {
    802.3ad ae<x>;
    (asynchronous-notification | no-asynchronous-notification);
    (auto-negotiation | no-auto-negotiation) remote-fault <local-interface-online |
      local-interface-offline>;
    auto-reconnect seconds;
    (flow-control | no-flow-control);
    ignore-l3-incompletes;
    (loopback | no-loopback);
    mpls {
      pop-all-labels {
        required-depth number;
      }
    }
    no-auto-mdix;
    source-address-filter {
      mac-address;
    }
    (source-filtering | no-source-filtering);
    ethernet-switch-profile {
      (mac-learn-enable | no-mac-learn-enable);
      tag-protocol-id [ tpids ];
      ethernet-policer-profile {
        input-priority-map {
          ieee802.1p premium [ values ];
        }
        output-priority-map {
          classifier {
            premium {
              forwarding-class class-name {
                loss-priority (high | low);
              }
            }
          }
        }
        policer cos-policer-name {
          aggregate {
            bandwidth-limit bps;
            burst-size-limit bytes;
          }
          premium {
            bandwidth-limit bps;
            burst-size-limit bytes;
          }
        }
      }
    }
  }
  (gratuitous-arp-reply | no-gratuitous-arp-reply);
  hold-time up milliseconds down milliseconds;
  ima-group-options {
    differential-delay number;
    frame-length (32 | 64 | 128 | 256);
```


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```
    frame-synchronization {
      alpha number;
      beta number;
      gamma number;
    }
    minimum-links number;
    symmetry (symmetrical-config-and-operation |
      symmetrical-config-asymmetrical-operation);
    test-procedure {
      ima-test-start;
      ima-test-stop;
      interface name;
      pattern number;
      period number;
    }
    transmit-clock (common | independent);
    version (1.0 |1.1);
  }
  ima-link-options group-id group-id;
  interface-set interface-set-name {
    interface ethernet-interface-name {
      (unit unit-number | vlan-tags-outer vlan-tag);
    }
    interface interface-name {
      (unit unit-number);
    }
  }
  isdn-options {
    bchannel-allocation (ascending | descending);
    calling-number number;
    pool pool-name <priority priority>;
    spid1 spid-string;
    spid2 spid-string;
    static-tei-val value;
    switch-type (att5e | etsi | ni1 | ntdms100 | ntt);
    t310 seconds;
    tei-option (first-call | power-up);
  }
  keepalives <down-count number> <interval seconds> <up-count number>;
  link-mode mode;
  lmi {
    lmi-type (ansi | itu | c-lmi);
    n391dte number;
    n392dce number;
    n392dte number;
    n393dce number;
    n393dte number;
    t391dte seconds;
    t392dce seconds;
  }
  lsq-failure-options {
    no-termination-request;
    [ trigger-link-failure interface-name ];
  }
  mac mac-address;
  mlfr-uni-nni-bundle-options {
```

```
    acknowledge-retries number;
    acknowledge-timer milliseconds;
    action-red-differential-delay (disable-tx | remove-link);
    drop-timeout milliseconds;
    fragment-threshold bytes;
    cisco-interoperability send-lip-remove-link-for-link-reject;
    hello-timer milliseconds;
    link-layer-overhead percent;
    lmi-type (ansi | itu | c-lmi);
    minimum-links number;
    mrru bytes;
    n391 number;
    n392 number;
    n393 number;
    red-differential-delay milliseconds;
    t391 seconds;
    t392 seconds;
    yellow-differential-delay milliseconds;
}
modem-options {
    dialin (console | routable);
    init-command-string initialization-command-string;
}
mtu bytes;
multi-chassis-protection {
    peer a.b.c.d {
        interfaceinterface-name;
        }
    }
multiservice-options {
    (core-dump | no-core-dump);
    (syslog | no-syslog);
}
native-vlan-id number;
no-gratuitous-arp-request;
no-keepalives;
no-partition {
    interface-type type;
}
no-vpivci-swapping;
otn-options {
    fec (efec | gfec | none);
    (laser-enable | no-laser-enable);
    (line-loopback | no-line-loopback);
    pass-thru;
    rate (fixed-stuff-bytes | no-fixed-stuff-bytes | pass-thru);
    transmit-payload-type number;
    trigger (oc-lof | oc-lom | oc-los | oc-wavelength-lock | odu-ais | odu-bbe-th | odu-bdi
        | odu-es-th | odu-lck | odu-oci | odu-sd | odu-ses-th | odu-ttim | odu-uas-th |
        opu-ptm | otu-ais | otu-bbe-th | otu-bdi | otu-es-th | otu-fec-deg | otu-fec-exe |
        otu-iae | otu-sd | otu-ses-th | otu-ttim | otu-uas-th);
    tti;
}
optics-options {
    wavelength nm;
    alarm alarm-name {
```


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```
        (syslog | link-down);
    }
    warning warning-name {
        (syslog | link-down);
    }
}
partition partition-number oc-slice oc-slice-range interface-type type;
timeslots time-slot-range;
passive-monitor-mode;
per-unit-scheduler;
ppp-options {
    chap {
        access-profile name;
        default-chap-secret name;
        local-name name;
        passive;
    }
    compression {
        acfc;
        pfc;
    }
    dynamic-profile profile-name;
    no-termination-request;
    pap {
        access-profile name;
        local-name name;
        local-password password;
        compression;
    }
}
psn-vcipsn-vci-identifier;
psn-vpipsn-vpi-identifier;
receive-bucket {
    overflow (discard | tag);
    rate percentage;
    threshold bytes;
}
redundancy-options {
    priority sp-fpc/pic/port;
    secondary sp-fpc/pic/port;
    hot-standby;
}
satop-options {
    payload-size n;
}
schedulers number;
serial-options {
    clock-rate rate;
    clocking-mode (dce | internal | loop);
    control-polarity (negative | positive);
    cts-polarity (negative | positive);
    dcd-polarity (negative | positive);
    dce-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
        dcd (ignore | normal | require);
```

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```
        dsr (ignore | normal | require);
        dtr signal-handling-option;
        ignore-all;
        indication (ignore | normal | require);
        rts (assert | de-assert | normal);
        tm (ignore | normal | require);
      }
      dsr-polarity (negative | positive);
      dte-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
        dcd (ignore | normal | require);
        dsr (ignore | normal | require);
        dtr signal-handling-option;
        ignore-all;
        indication (ignore | normal | require);
        rts (assert | de-assert | normal);
        tm (ignore | normal | require);
      }
      dtr-circuit (balanced | unbalanced);
      dtr-polarity (negative | positive);
      encoding (nrz | nrzi);
      indication-polarity (negative | positive);
      line-protocol protocol;
      loopback mode;
      rts-polarity (negative | positive);
      tm-polarity (negative | positive);
      transmit-clock invert;
    }
    services-options {
      inactivity-timeout seconds;
      open-timeout seconds;
      session-limit {
        maximum number;
        rate new-sessions-per-second;
        }
        syslog {
        host hostname {
          facility-override facility-name;
          log-prefix prefix-number;
          services priority-level;
        }
      }
    }
    shdsl-options {
      annex (annex-a | annex-b);
      line-rate line-rate;
      loopback (local | remote);
      snr-margin {
        current margin;
        snext margin;
      }
    }
    sonet-options {
      aggregate asx;
      aps {
```


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```
        advertise-interval milliseconds;
        annex-b;
        authentication-key key;
        fast-aps-switch;
        force;
        hold-time milliseconds;
        lockout;
        neighbor address;
        paired-group group-name;
        preserve-interface;
        protect-circuit group-name;
        request;
        revert-time seconds;
        switching-mode (bidirectional | unidirectional);
        working-circuit group-name;
    }
    bytes {
        c2 value;
        e1-quiet value;
        f1 value;
        f2 value;
        s1 value;
        z3 value;
        z4 value;
    }
    fcs (16 | 32);
    loopback (local | remote);
    mpls {
        pop-all-labels {
            required-depth number;
        }
    }
    path-trace trace-string;
    (payload-scrambler | no-payload-scrambler);
    rfc-2615;
    trigger {
        defect ignore;
        hold-time up milliseconds down milliseconds;
    }
    vtmapping (itu-t | klm);
    (z0-increment | no-z0-increment);
}
speed (10m | 100m | 1g | oc3 | oc12 | oc48);
stacked-vlan-tagging;
switch-options {
    switch-port port-number {
        (auto-negotiation | no-auto-negotiation);
        speed (10m | 100m | 1g);
        link-mode (full-duplex | half-duplex);
    }
}
t1-options {
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    buildout value;
```

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```
    byte-encoding (nx56 | nx64);
    crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);
    crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);
    fcs (16 | 32);
    framing (esf | sf);
    idle-cycle-flag (flags | ones);
    invert-data;
    line-encoding (ami | b8zs);
    loopback (local | payload | remote);
    remote-loopback-respond;
    start-end-flag (filler | shared);
    timeslots time-slot-range;
}
t3-options {
    atm-encapsulation (direct | plcp);
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    buildout feet;
    (cbit-parity | no-cbit-parity);
    compatibility-mode (adtran | digital-link | kentrox | larscom | verilink) <subrate
      value>;
    fcs (16 | 32);
    (feac-loop-respond | no-feac-loop-respond);
    idle-cycle-flag value;
    (long-buildout | no-long-buildout);
    (loop-timing | no-loop-timing);
    loopback (local | payload | remote);
    (mac | no-mac);
    (payload-scrambler | no-payload-scrambler);
    start-end-flag (filler | shared);
}
traceoptions {
    flag flag <flag-modifier> <disable>;
}
transmit-bucket {
    overflow discard;
    rate percentage;
    threshold bytes;
}
(traps | no-traps);
unidirectional;
vlan-tagging;
vlan-vci-tagging;
unit logical-unit-number {
    accept-source-mac {
        mac-address mac-address {
            policer {
                input cos-policer-name;
                output cos-policer-name;
            }
        }
    }
    accounting-profile name;
    advisory-options {
        downstream-rate rate;
```


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```
    upstream-rate rate;
}
allow-any-vci;
atm-scheduler-map (map-name | default);
backup-options {
    interface interface-name;
}
bandwidth rate;
cell-bundle-size cells;
clear-dont-fragment-bit;
compression {
    rtp {
        f-max-period number;
        maximum-contexts number <force>;
        queues [ queue-numbers ];
        port {
            minimum port-number;
            maximum port-number;
        }
    }
}
compression-device interface-name;
copy-tos-to-outer-ip-header;
demux-destination family;
demux-source family;
demux-options {
    underlying-interface interface-name;
}
description text;
alias alias-name;
interface {
    l2tp-interface-id name;
    (dedicated | shared);
}
dialer-options {
    activation-delay seconds;
    callback;
    callback-wait-period time;
    deactivation-delay seconds;
    dial-string [ dial-string-numbers ];
    idle-timeout seconds;
    incoming-map {
        caller (caller-id | accept-all);
        initial-route-check seconds;
        load-interval seconds;
        load-threshold percent;
        pool pool-name;
        redial-delay time;
        watch-list {
            [ routes ];
        }
    }
}
disable;
disable-mlppp-inner-ppp-pfc;
dlci dlci-identifier;
```

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```
drop-timeout milliseconds;
dynamic-call-admission-control {
   activation-priority priority;
   bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
fragment-threshold bytes;
inner-vlan-id-range start start-id end end-id;
input-vlan-map {
   (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
   inner-tag-protocol-id tpid;
   inner-vlan-id number;
   tag-protocol-id tpid;
   vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
   input-policer policer-name;
   input-three-color policer-name;
   output-policer policer-name;
   output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
   down-count cells;
   up-count cells;
}
oam-period (seconds | disable);
output-vlan-map {
   (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
   inner-tag-protocol-id tpid;
   inner-vlan-id number;
   tag-protocol-id tpid;
   vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
   chap {
      access-profile name;
      default-chap-secret name;
      local-name name;
      passive;
   }
   compression {
      acfc;
```


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```
        pfc;
        pap;
        default-pap-password password;
        local-name name;
        local-password password;
        passive;
    }
    dynamic-profile profile-name;
    lcp-max-conf-req number;
    lcp-restart-timer milliseconds;
    loopback-clear-timer seconds;
    ncp-max-conf-req number;
    ncp-restart-timer milliseconds;
}
pppoe-options {
    access-concentrator name;
    auto-reconnect seconds;
    (client | server);
    service-name name;
    underlying-interface interface-name;
}
proxy-arp;
service-domain (inside | outside);
shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
      burst length);
    queue-length number;
}
short-sequence;
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
    backup-destination address;
    destination address;
    key number;
    routing-instance {
        destination routing-instance-name;
    }
    source source-address;
    ttl number;
}
vci vpi-identifier.vci-identifier;
vci-range start start-vci end end-vci;
vpi vpi-identifier;
vlan-id number;
vlan-id-list [vlan-id vlan-id–vlan-id];
vlan-id-range number-number;
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
vlan-tags-outer tpid.vlan-id inner-list [vlan-id vlan-id–vlan-id];
family family {
    accounting {
        destination-class-usage;
        source-class-usage {
            direction;
```

```
    }
  }
  access-concentrator name;
  address address {
    destination address;
  }
  bundle ml-fpc/pic/port | ls-fpc/pic/port);
  direct-connect;
  duplicate-protection;
  dynamic-profile profile-name;
  filter {
    group filter-group-number;
    input filter-name;
    input-list {
      [ filter-names ];
      output filter-name;
    }
    output-list {
      [ filter-names ];
    }
  }
  ipsec-sa sa-name;
  keep-address-and-control;
  max-sessions number;
  max-sessions-vsa-ignore;
  mtu bytes;
  multicast-only;
  negotiate-address;
  no-redirects;
  policer {
    arp policer-template-name;
    disable-arp-policer
    input policer-template-name;
    output policer-template-name;
  }
  primary;
  proxy inet-address address;
  receive-options-packets;
  receive-ttl-exceeded;
  remote (inet-address address | mac-address address);
  rpf-check {
    fail-filter filter-name;
    mode loose;
  }
  sampling {
    direction;
  }
  service {
    input {
      service-set service-set-name <service-filter filter-name>;
      post-service-filter filter-name;
    }
    output {
      service-set service-set-names <service-filter filter-name>;
    }
  }
```


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```
service-name-table table-name;
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
  maximum-seconds>;
targeted-broadcast {
  forward-and-send-to-re;
  forward-only;
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
translate-plp-control-word-de;
unnumbered-address interface-name <destination address destination-profile
  profile-name | preferred-source-address address>;
address address {
  arp ip-address (mac | multicast-mac) mac-address <publish>;
  broadcast address;
  destination address;
  destination-profile name;
  eui-64;
  multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
  multipoint-destination address {
    epd-threshold cells plp1 cells;
    inverse-arp;
    oam-liveness {
      up-count cells;
      down-count cells;
    }
    oam-period (seconds | disable);
    shaping {
      (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
        rate burst length);
      queue-length number;
    }
    vci vpi-identifier.vci-identifier;
  }
  preferred;
  primary;
  (vrrp-group | vrrp-inet6-group) group-number {
    (accept-data | no-accept-data);
    advertise–interval seconds;
    authentication-type authentication;
    authentication-key key;
    fast-interval milliseconds;
    (preempt | no-preempt) {
      hold-time seconds;
    }
    priority-number number;
    track {
      priority-cost seconds;
      priority-hold-time interface-name {
        bandwidth-threshold bits-per-second {
          priority;
        }
        interface priority;
      }
      route ip-address/mask routing-instance instance-name priority-cost cost;
    }
```

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```
                virtual-address [ addresses ];
              }
            }
          }
        }
      }
    }
```

Related Documentation

- *Junos OS Hierarchy and RFC Reference*
- *Ethernet Interfaces Feature Guide for Routing Devices*
- *Junos OS Network Interfaces Library for Routing Devices*

[edit logical-systems] Hierarchy Level

The following lists the statements that can be configured at the **[edit logical-systems]** hierarchy level that are also documented in this manual. For more information about logical systems, see the *Logical Systems Feature Guide for Routing Devices*.

```
logical-systems logical-system-name {
  interfaces interface-name {
    unit logical-unit-number {
      accept-source-mac {
        mac-address mac-address {
          policer {
            input cos-policer-name;
            output cos-policer-name;
          }
        }
      }
      allow-any-vci;
      atm-scheduler-map (map-name | default);
      bandwidth rate;
      backup-options {
        interface interface-name;
      }
      cell-bundle-size cells;
      clear-dont-fragment-bit;
      compression {
        rtp {
          f-max-period number;
          port {
            minimum port-number;
            maximum port-number;
          }
          queues [ queue-numbers ];
        }
      }
      compression-device interface-name;
      description text;
      interface {
        l2tp-interface-id name;
        (dedicated | shared);
      }
```


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```
dialer-options {
    activation-delay seconds;
    deactivation-delay seconds;
    dial-string [ dial-string-numbers ];
    idle-timeout seconds;
    initial-route-check seconds;
    load-threshold number;
    pool pool;
    remote-name remote-callers;
    watch-list {
        [ routes ];
    }
}
disable;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
    activation-priority priority;
    bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
fragment-threshold bytes;
input-vlan-map {
    inner-tag-protocol-id;
    inner-vlan-id;
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    tag-protocol-id tpid;
    vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
    output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
    up-count cells;
    down-count cells;
}
oam-period (seconds | disable);
output-vlan-map {
    inner-tag-protocol-id;
    inner-vlan-id;
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-swap);
    tag-protocol-id tpid;
    vlan-id number;
```

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```
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
  chap {
    access-profile name;
    default-chap-secret name;
    local-name name;
    passive;
  }
  compression {
    acfc;
    pfc;
    }
  }
  dynamic-profile profile-name;
  pap {
    default-pap-password password;
    local-name name;
    local-password password;
    passive;
  }
}
proxy-arp;
service-domain (inside | outside);
shaping {
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
    burst length);
  queue-length number;
}
short-sequence;
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
  backup-destination address;
  destination address;
  key number;
  routing-instance {
    destination routing-instance-name;
  }
  source source-address;
  ttl number;
}
vci vpi-identifier.vci-identifier;
vlan-id number;
vlan-id-list [vlan-id vlan-id–vlan-id]
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
vlan-tags outer tpid.vlan-id inner-list [vlan-id vlan-id–vlan-id]
vpi vpi-identifier;
family family {
  accounting {
    destination-class-usage;
```


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```
    source-class-usage {
      direction;
    }
  }
  bundle interface-name;
  filter {
    group filter-group-number;
    input filter-name;
    input-list {
      [ filter-names ];
    }
    output filter-name;
    output-list {
      [ filter-names ];
    }
  }
  ipsec-sa sa-name;
  keep-address-and-control;
  mtu bytes;
  multicast-only;
  no-redirects;
  policer {
    arp policer-template-name;
    input policer-template-name;
    output policer-template-name;
  }
  primary;
  proxy inet-address address;
  receive-options-packets;
  receive-ttl-exceeded;
  remote (inet-address address | mac-address address);
  rpf-check <fail-filter filter-name> {
    <mode loose>;
  }
  sampling {
    direction;
  }
  service {
    input {
      service-set service-set-name <service-filter filter-name>;
      post-service-filter filter-name;
    }
    output {
      service-set service-set-name <service-filter filter-name>;
    }
  }
  (translate-discard-eligible | no-translate-discard-eligible);
  (translate-fecn-and-becn | no-translate-fecn-and-becn);
  unnumbered-address interface-name destination address destination-profile
    profile-name;
  address address {
    arp ip-address (mac | multicast-mac) mac-address <publish>;
    broadcast address;
    destination address;
    destination-profile name;
    eui-64;
```

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```
                multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
                multipoint-destination address {
                  epd-threshold cells plp1 cells;
                  inverse-arp;
                  oam-liveness {
                    up-count cells;
                    down-count cells;
                  }
                  oam-period (seconds | disable);
                  shaping {
                    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
                      rate burst length);
                    queue-length number;
                  }
                  vci vpi-identifier.vci-identifier;
                }
                preferred;
                primary;
                (vrrp-group | vrrp-inet6-group) group-number {
                  (accept-data | no-accept-data);
                  advertise–interval seconds;
                  authentication-type authentication;
                  authentication-key key;
                  fast-interval milliseconds;
                  (preempt | no-preempt) {
                    hold-time seconds;
                  }
                  priority-number number;
                  track {
                    priority-cost seconds;
                    priority-hold-time interface-name {
                      interface priority;
                      bandwidth-threshold bits-per-second {
                        priority;
                      }
                    }
                    route ip-address/mask routing-instance instance-name priority-cost cost;
                  }
                }
                virtual-address [ addresses ];
              }
            }
          }
        }
      }
```

Related Documentation

- *Junos OS Hierarchy and RFC Reference*
- *Ethernet Interfaces Feature Guide for Routing Devices*
- *Junos OS Network Interfaces Library for Routing Devices*

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address

Syntax

```
address address {
  arp ip-address (mac | multicast-mac) mac-address <publish>;
  broadcast address;
  destination address;
  destination-profile name;
  eui-64;
  master-only;
  multipoint-destination address dlci dlci-identifier;
  multipoint-destination address {
    epd-threshold cells;
    inverse-arp;
    oam-liveness {
      up-count cells;
      down-count cells;
    }
    oam-period (disable | seconds);
    shaping {
      (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
        length);
      queue-length number;
    }
    vci vpi-identifier.vci-identifier;
  }
  primary;
  preferred;
  (vrrp-group | vrrp-inet6-group) group-number {
    (accept-data | no-accept-data);
    advertise–interval seconds;
    authentication-type authentication;
    authentication-key key;
    fast-interval milliseconds;
    (preempt | no-preempt) {
      hold-time seconds;
    }
    priority-number number;
    track {
      priority-cost seconds;
      priority-hold-time interface-name {
        interface priority;
        bandwidth-threshold bits-per-second {
          priority;
        }
      }
      route ip-address/mask routing-instance instance-name priority-cost cost;
    }
    virtual-address [ addresses ];
  }
}
```

Hierarchy Level

[edit interfaces *interface-name* unit *logical-unit-number* family *family*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

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Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 11.1 for the QFX Series.

Description Configure the interface address.

Options ***address***—Address of the interface.

- In Junos OS Release 13.3 and later, when you configure an IPv6 host address and an IPv6 subnet address on an interface, the commit operation fails.
- In releases earlier than Junos OS Release 13.3, when you use the same configuration on an interface, the commit operation succeeds, but only one of the IPv6 addresses that was entered is assigned to the interface. The other address is not applied.

The remaining statements are explained separately.

NOTE: **The edit logical-systems hierarchy is not available on QFabric systems.**

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring the Protocol Family*
- *Junos OS Administration Library for Routing Devices*
- *family*
- *negotiate-address*
- *unnumbered-address (Ethernet)*

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advertise-interval

Syntax advertise-interval *milliseconds*;

Hierarchy Level [edit interfaces *interface-name* sonet-options aps]

Release Information Statement introduced before Junos OS Release 7.4.

Description Modify the Automatic Protection Switching (APS) interval at which the protect and working routers send packets to their neighbors to advertise that they are operational. A router considers its neighbor to be operational for a period, called the hold time, that is, by default, three times the advertisement interval.

Options ***milliseconds***—Interval between advertisement packets.

Range: 1 through 65,534 milliseconds

Default: 1000 milliseconds

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring APS Timers*

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aps

Syntax

```
aps {
  advertise-interval milliseconds;
  annex-b
  authentication-key key;
  (break-before-make | no-break-before-make);
  fast-aps-switch;
  force;
  hold-time milliseconds;
  lockout;
  neighbor address;
  paired-group group-name;
  preserve-interface;
  protect-circuit group-name;
  request;
  revert-time seconds;
  switching-mode (bidirectional | unidirectional);
  working-circuit group-name;
}
```

Hierarchy Level [edit interfaces *interface-name* sonet-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure Automatic Protection Switching (APS) on the router.

For DS3 channels on a channelized OC12 interface, configure APS on channel 0 only. If you configure APS on channels 1 through 11, it is ignored.

The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Automatic Protection Switching and Multiplex Section Protection Overview*

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authentication-key

Syntax authentication-key *key*;

Hierarchy Level [edit interfaces *interface-name* sonet-options aps]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure the Automatic Protection Switching (APS) authentication key (password).

Options *key*—Authentication password. It can be 1 through 8 characters long. Configure the same key for both the working and protect routers.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring Basic Automatic Protect Switching*
- For information about the **authentication-key** statement at the **[edit interfaces *interface-name* unit *unit-number* family inet address *address* (vrrp-group | vrrp-inet6-group) *group-number*]** or **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *unit-number* family (inet | inet6) address *address* (vrrp-group | vrrp-inet6-group) *group-number*]** hierarchy level, see the *Junos OS High Availability Library for Routing Devices*.

bchannel-allocation

Syntax bchannel-allocation (ascending | descending);

Hierarchy Level [edit interfaces *interface-name* isdn-options]

Release Information Statement introduced in Junos OS Release 8.3.

Description (J Series Services Routers equipped with a Dual-Port Channelized T1/E1 PIM) For Integrated Services Digital Network Primary Rate Interfaces (ISDN PRI), allocate PRI dialout B-channels in ascending or descending order.

Options (**ascending** | **descending**)—Allocate the B-channels in ascending (from low to high) or descending (from high to low) order.

Default: Descending order

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Allocating B-Channels for Dialout on page 121
- *Junos OS Interfaces and Routing Configuration Guide*

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bert-algorithm

Syntax bert-algorithm *algorithm*;

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces ct1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure the pattern to send in the bit stream during a bit error rate test (BERT). Applies to T1, E3, T3, and multichannel DS3 interfaces, the channelized interfaces (DS3, OC12, STM1), and channelized IQ and IQE interfaces (E1, E3 and DS3).

NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **bert-algorithm** statement must be included at the **[edit interfaces ce1-*fpc/pic/port*]** or **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level as appropriate.

Options ***algorithm***—Pattern to send in the bit stream. There are two categories of test patterns: pseudorandom and repetitive. Both patterns conform to CCITT/ITU O.151, O.152, O.153, and O.161 standards. The algorithm can be one of the following patterns:

- **all-ones-repeating**—Pattern is all ones.
- **all-zeros-repeating**—Pattern is all zeros.
- **alternating-double-ones-zeros**—Pattern is alternating pairs of ones and zeros.
- **alternating-ones-zeros**—Pattern is alternating ones and zeros.
- **pseudo-2e3**—Pattern is $2^3 - 1$.
- **pseudo-2e4**—Pattern is $2^4 - 1$.
- **pseudo-2e5**—Pattern is $2^5 - 1$.
- **pseudo-2e6**—Pattern is $2^6 - 1$.
- **pseudo-2e7**—Pattern is $2^7 - 1$.
- **pseudo-2e9-o153**—Pattern is $2^9 - 1$, as defined in the O153 standard.
- **pseudo-2e10**—Pattern is $2^{10} - 1$.
- **pseudo-2e11-o152**—Pattern is $2^{11} - 1$, as defined in the O152 standard.

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- **pseudo-2e15-o151**—Pattern is $2^{15} - 1$, as defined in the O151 standard.
- **pseudo-2e17**—Pattern is $2^{17} - 1$.
- **pseudo-2e18**—Pattern is $2^{18} - 1$.
- **pseudo-2e20-o151**—Pattern is $2^{20} - 1$, as defined in the O151 standard.
- **pseudo-2e20-o153**—Pattern is $2^{20} - 1$, as defined in the O153 standard.
- **pseudo-2e21**—Pattern is $2^{21} - 1$.
- **pseudo-2e22**—Pattern is $2^{22} - 1$.
- **pseudo-2e23-o151**—Pattern is $2^{23} - 1$, as defined in the O151 standard.
- **pseudo-2e25**—Pattern is $2^{25} - 1$.
- **pseudo-2e28**—Pattern is $2^{28} - 1$.
- **pseudo-2e29**—Pattern is $2^{29} - 1$.
- **pseudo-2e31**—Pattern is $2^{31} - 1$.
- **pseudo-2e32**—Pattern is $2^{32} - 1$.
- **repeating-1-in-4**—One bit in four is set to 1; the others are set to 0.
- **repeating-1-in-8**—One bit in eight is set to 1; the others are set to 0.
- **repeating-3-in-24**—Three bits in twenty four are set to 1; the others are set to 0.

Default: **pseudo-2e3**

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Interface Diagnostics on page 229
- *Configuring E1 BERT Properties*
- *Configuring E3 BERT Properties*
- *Configuring T1 BERT Properties*
- *Configuring T3 BERT Properties*
- *Examples: Configuring T3 Interfaces*
- bert-error-rate on page 374
- bert-period on page 376

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bert-error-rate

Syntax bert-error-rate *rate*;

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces ct1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure the bit error rate to use in a BERT procedure. Applies to E1, E3, T1, or T3 interfaces, and to the channelized interfaces (DS3, OC3, OC12, and STM1).

NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **bert-error-rate** statement must be included at the **[edit interfaces ce1-*fpc/pic/port*]** or **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level as appropriate.

When configuring **t3-options bert-error-rate** on J Series routers, only 0 and 3 through 7 are valid values. If you enter 1 or 2, Junos OS will return the error message **configuration check-out failed**.

Options ***rate***—Bit error rate.

Range: 0 through 7, which corresponds to 10^{-1} (1 error per bit) to 10^{-7} (1 error per 10 million bits)

Default: 0

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- bert-algorithm on page 372
- bert-period on page 376
- ds0-options on page 440
- e1-options on page 383
- *e3-options*
- t1-options on page 427
- t3-options on page 428

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- Interface Diagnostics on page 229
- *Configuring E1 BERT Properties*
- *Configuring E3 BERT Properties*
- *Configuring T1 BERT Properties*
- *Configuring T3 BERT Properties*
- *Examples: Configuring T3 Interfaces*

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bert-period

Syntax bert-period *seconds*;

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces ct1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure the duration of a BERT test. Applies to E1, E3, T1, and T3 interfaces, and to E1, E3, T1, and T3 partitions on the channelized interfaces (CE1, CT1, DS3, OC3, OC12, OC48, STM1, STM4, and STM16).

E1 and T1 IQ, IQE, and standard interfaces support an extended BERT period range, up to 86,400 seconds (24 hours).

NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **bert-period** statement must be included at the **[edit interfaces ce1-*fpc/pic/port*]** or **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level as appropriate.

Options ***seconds***—Test duration. Range and default values vary by interface type.

Range:

- PIC-dependent—Normal BERT period: either 1 through 239 seconds or 1 through 240 seconds
- PIC-dependent—Extended BERT period: from 1 through 86,400 seconds

Default:

- Normal BERT period: 10 seconds
- Extended BERT period (on supported E1 interfaces): 10 seconds
- Extended BERT period (on supported T1 interfaces): 240 seconds

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Interface Diagnostics on page 229
- *Configuring E1 BERT Properties*

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- *Configuring E3 BERT Properties*
- *Configuring T1 BERT Properties*
- *Configuring T3 BERT Properties*
- bert-algorithm on page 372
- bert-error-rate on page 374

byte-encoding

Syntax byte-encoding (nx56 | nx64);

Hierarchy Level [edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* t1-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Set the byte encoding on a DS0 or T1 interface to use 7 bits per byte or 8 bits per byte.

NOTE: When configuring T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the byte-encoding statement must be included at the [edit interfaces t1-*fpc/pic/port*] hierarchy level.

Default The default byte encoding is 8 bits per byte (nx64).

Options **nx56**—Use 7 bits per byte.

nx64—Use 8 bits per byte.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- *Configuring T1 Byte Encoding*

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bytes

Syntax

```
bytes {
  c2 value;
  e1-quiet value;
  f1 value;
  f2 value;
  s1 value;
  z3 value;
  z4 value;
}
```

Hierarchy Level [edit interfaces *interface-name* sonet-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description Set values in some SONET/SDH header bytes.

Options

c2 *value*—Path signal label SONET/SDH overhead byte. SONET/SDH frames use the C2 byte to indicate the contents of the payload inside the frame. SONET/SDH interfaces use the C2 byte to indicate whether the payload is scrambled.

Range: 0 through 255

Default: 0xCF

e1-quiet *value*—Default idle byte sent on the orderwire SONET/SDH overhead bytes. The router does not support the orderwire channel, and hence sends this byte continuously.

Range: 0 through 255

Default: 0x7F

f1 *value*, **f2 *value***, **z3 *value***, **z4 *value***—SONET/SDH overhead bytes.

Range: 0 through 255

Default: 0x00

s1 *value*—Synchronization message SONET overhead byte. This byte is normally controlled as a side effect of the system reference clock configuration and the state of the external clock coming from an interface if the system reference clocks have been configured to use an external reference.

Range: 0 through 255

Default: 0xCC

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring SONET/SDH Header Byte Values*
- *no-concatenate*

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cbit-parity

Syntax (cbit-parity | no-cbit-parity);

Hierarchy Level [edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description For T3 interfaces only, enable or disable C-bit parity mode, which controls the type of framing that is present on the transmitted T3 signal. When C-bit parity mode is enabled, the C-bit positions are used for the far-end block error (FEBE), far-end alarm and control (FEAC), terminal data link, path parity, and mode indicator bits, as defined in ANSI T1.107a-1989. For ATM and ATM2 IQ2 and IQ2-E interfaces, M23 framing is used when the **no-cbit-parity** statement is included. For all other interfaces, M13 framing is used when the **no-cbit-parity** statement is included.

Default C-bit parity mode is enabled.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- *Configuring E3 and T3 Parameters on ATM Interfaces*
- *Disabling T3 C-Bit Parity Mode*

channelization

Syntax channelization;

Hierarchy Level [edit chassis fpc *slot-number* pic *pic-number*]

Release Information Statement introduced in Junos OS Release 11.4.

Description Enable the DS3/E3 MIC on MX Series routers with Queuing and Enhanced Queuing MPCs (MX-MPC1-3D-Q, MX-MPC2-3D-Q, and MX-MPC2-3D-EQ) or on MX80 routers to function in channelized mode.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring the Junos OS to Enable Channelization on DS3/E3 MIC on page 207

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clocking

Syntax clocking (external [interface *interface-name*] | internal);

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.
interface option added in Junos OS Release 8.2.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description For interfaces that can use various clock sources, configure the source of the transmit clock on each interface.

NOTE: On Channelized SONET/SDH PICs, if you set the parent (or the master) controller clock to external, then you must set the child controller clocks to the default value—that is, internal.

For example, on the Channelized STM1 PIC, if the clock on the Channelized STM1 interface (which is the master controller) is set to external, then you must not configure the CE1 interface (which is the child controller) clock to external. Instead you must configure the CE1 interface clock to internal.

Options **external**—The clock source is provided by the data communication equipment (DCE).

interface *interface-name*—For interfaces operating on T1/E1 PIMs for J Series Services Routers only, configure clocking for the drop-and insert feature. When configuring this feature, both ports must use the same clock source: either the router's internal clock or an external clock on one of the interfaces. If an external clock source is required, one interface must specify clocking external and the other must specify the same clock.

internal—Use the internal stratum 3 clock as the reference clock.

Default: internal

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring the Clock Source*
- *Configuring the Clock Source on SONET/SDH Interfaces*
- Clock Sources on Channelized Interfaces on page 8
- Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots on page 116
- *loop-timing*

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data-input

Syntax data-input (system | interface *interface-name*);

Hierarchy Level [edit interfaces ds-*pim*/0/*port*:*channel*]

Release Information Statement introduced in Junos OS Release 8.2.

Description For interfaces operating on T1/E1 PIMs for J Series Services Routers only, configure whether an interface should send and receive data from the Routing Engine or from a given interface name. On channelized T1/E1 interfaces partitioned into channels, you can insert time slots from one port directly into the other port on the same PIM, to replace time slots coming through the Routing Engine.

To avoid slips, both ports must use the same clock source: either the router's internal clock or an external clock on one of the interfaces. If an external clock source is required, one interface must specify clocking external and the other must specify the same clock by including the **clocking external interface *interface-name*** statement at the **[edit interfaces *interface-name*]** hierarchy level.

Options **system**—Interface sends and receives data from the Routing Engine.

interface *interface-name*—Interface sends and receives data from a specific interface.

Default: Data is sent and received from the Routing Engine (system).

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots on page 116
- *Junos OS Interfaces and Routing Configuration Guide*
- clocking on page 380

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dlci

Syntax dlci *dlci-identifier*;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For Frame Relay and Multilink Frame Relay (MLFR) user-to-network interface (UNI) network-to-network interface (NNI) encapsulation only, and for link services, voice services and point-to-point interfaces only, configure the data-link connection identifier (DLCI) for a permanent virtual circuit (PVC) or an switched virtual circuit (SVC).

To configure a DLCI for a point-to-multipoint interface, use the **multipoint-destination** statement to specify the DLCI.

Options ***dlci-identifier***—Data-link connection identifier.
Range: 16 through 1022.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Data-Link Connection Identifiers on Channelized Interfaces on page 6
- *Configuring Frame Relay DLCIs*
- *Junos OS Services Interfaces Library for Routing Devices*
- encapsulation (Logical Interface) on page 384
- multicast-dlci on page 413
- multipoint-destination on page 414

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e1-options

Syntax

```
e1-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  fcs (16 | 32);
  framing (g704 | g704-no-crc4 | unframed);
  idle-cycle-flag (flags | ones);
  invert-data;
  loopback (local | remote);
  start-end-flag (filler | shared);
  timeslots time-slot-range;
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure E1-specific physical interface properties.

The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Channelized E1 IQ and IQE Interfaces Overview on page 29
- Channelized STM1 Interfaces Overview on page 183
- *E1 Interfaces Overview*
- *T1 Interfaces Overview*

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encapsulation (Logical Interface)

Syntax encapsulation (atm-ccc-cell-relay | atm-ccc-vc-mux | atm-cisco-nlpid | atm-mlppp-llc | atm-nlpid | atm-ppp-llc | atm-ppp-vc-mux | atm-snap | atm-tcc-snap | atm-tcc-vc-mux | atm-vc-mux | ether-over-atm-llc | ether-vpls-over-atm-llc | ether-vpls-over-fr | ether-vpls-over-ppp | ethernet | ethernet-ccc | ethernet-vpls | ethernet-vpls-fr | frame-relay-ccc | frame-relay-ether-type | frame-relay-ether-type-tcc | frame-relay-ppp | frame-relay-tcc | gre-fragmentation | multilink-frame-relay-end-to-end | multilink-ppp | ppp-over-ether | ppp-over-ether-over-atm-llc | vlan-bridge | vlan-ccc | vlan-vci-ccc | vlan-tcc | vlan-vpls);

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*],
[edit interfaces rlsq *number* unit *logical-unit-number*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers (**ethernet**,**vlan-ccc**, and **vlan-tcc** options only).
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers. Only the **atm-ccc-cell-relay** and **atm-ccc-vc-mux** options are supported on ACX Series routers.

Description Configure a logical link-layer encapsulation type.

Options **atm-ccc-cell-relay**—Use ATM cell-relay encapsulation.

atm-ccc-vc-mux—Use ATM virtual circuit (VC) multiplex encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

atm-cisco-nlpid—Use Cisco ATM network layer protocol identifier (NLPID) encapsulation. When you use this encapsulation type, you can configure the **inet** family only.

atm-mlppp-llc—For ATM2 IQ interfaces only, use Multilink Point-to-Point (MLPPP) over AAL5 LLC. For this encapsulation type, your router must be equipped with a Link Services or Voice Services PIC. MLPPP over ATM encapsulation is not supported on ATM2 IQ OC48 interfaces.

atm-nlpid—Use ATM NLPID encapsulation. When you use this encapsulation type, you can configure the **inet** family only.

atm-ppp-llc—(ATM2 IQ interfaces and MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP only) Use PPP over AAL5 LLC encapsulation.

atm-ppp-vc-mux—(ATM2 IQ interfaces and MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP only) Use PPP over ATM AAL5 multiplex encapsulation.

atm-snap—(All interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) Use ATM subnetwork attachment point (SNAP) encapsulation.

atm-tcc-snap—Use ATM SNAP encapsulation on translational cross-connect (TCC) circuits.

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atm-tcc-vc-mux—Use ATM VC multiplex encapsulation on TCC circuits. When you use this encapsulation type, you can configure the **tcc** family only.

atm-vc-mux—(All interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) Use ATM VC multiplex encapsulation. When you use this encapsulation type, you can configure the **inet** family only.

ether-over-atm-llc—(All IP interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) For interfaces that carry IP traffic, use Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure multipoint interfaces.

ether-vpls-over-atm-llc—For ATM2 IQ interfaces only, use the Ethernet virtual private LAN service (VPLS) over ATM LLC encapsulation to bridge Ethernet interfaces and ATM interfaces over a VPLS routing instance (as described in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*). Packets from the ATM interfaces are converted to standard ENET2/802.3 encapsulated Ethernet frames with the frame check sequence (FCS) field removed.

ether-vpls-over-fr—For E1, T1, E3, T3, and SONET interfaces only, use the Ethernet virtual private LAN service (VPLS) over Frame Relay encapsulation to support Bridged Ethernet over Frame Relay encapsulated TDM interfaces for VPLS applications, per RFC 2427, *Multiprotocol Interconnect over Frame Relay*.

NOTE: The SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP, the Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP, and the DS3/E3 MIC do not support Ethernet over Frame Relay encapsulation.

ether-vpls-over-ppp—For E1, T1, E3, T3, and SONET interfaces only, use the Ethernet virtual private LAN service (VPLS) over Point-to-Point Protocol (PPP) encapsulation to support Bridged Ethernet over PPP-encapsulated TDM interfaces for VPLS applications.

ethernet—Use Ethernet II encapsulation (as described in RFC 894, *A Standard for the Transmission of IP Datagrams over Ethernet Networks*).

ethernet-ccc—Use Ethernet CCC encapsulation on Ethernet interfaces.

ethernet-vpls—Use Ethernet VPLS encapsulation on Ethernet interfaces that have VPLS enabled and that must accept packets carrying standard Tag Protocol ID (TPID) values.

NOTE: The built-in Gigabit Ethernet PIC on an M7i router does not support extended VLAN VPLS encapsulation.

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ethernet-vpls-fr—Use in a VPLS setup when a CE device is connected to a PE device over a time-division multiplexing (TDM) link. This encapsulation type enables the PE device to terminate the outer layer 2 Frame Relay connection, use the 802.1p bits inside the inner Ethernet header to classify the packets, look at the MAC address from the Ethernet header, and use the MAC address to forward the packet into a given VPLS instance.

frame-relay-ccc—Use Frame Relay encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

frame-relay-ether-type—Use Frame Relay ether type encapsulation for compatibility with Cisco Frame Relay. The physical interface must be configured with flexible-frame-relay encapsulation.

frame-relay-ether-type-tcc—Use Frame Relay ether type TCC for Cisco-compatible Frame Relay on TCC circuits to connect different media. The physical interface must be configured with flexible-frame-relay encapsulation.

frame-relay-ppp—Use PPP over Frame Relay circuits. When you use this encapsulation type, you can configure the **ppp** family only.

frame-relay-tcc—Use Frame Relay encapsulation on TCC circuits for connecting different media. When you use this encapsulation type, you can configure the **tcc** family only.

gre-fragmentation—For adaptive services interfaces only, use GRE fragmentation encapsulation to enable fragmentation of IPv4 packets in GRE tunnels. This encapsulation clears the do not fragment (DF) bit in the packet header. If the packet's size exceeds the tunnel's maximum transmission unit (MTU) value, the packet is fragmented before encapsulation.

multilink-frame-relay-end-to-end—Use MLFR FRF.15 encapsulation. This encapsulation is used only on multilink, link services, and voice services interfaces and their constituent T1 or E1 interfaces, and is supported on LSQ and redundant LSQ interfaces.

multilink-ppp—Use MLPPP encapsulation. This encapsulation is used only on multilink, link services, and voice services interfaces and their constituent T1 or E1 interfaces.

ppp-over-ether—You use PPP over Ethernet encapsulation to configure an underlying Ethernet interface for a dynamic PPPoE logical interface on M120 and M320 routers with Intelligent Queuing 2 (IQ2) PICs, and on MX Series routers with MPCs.

ppp-over-ether-over-atm-llc—(MX Series routers with MPCs using the ATM MIC with SFP only) For underlying ATM interfaces, use PPP over Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure the interface address. Instead, configure the interface address on the PPP interface.

vlan-bridge—Use Ethernet VLAN bridge encapsulation on Ethernet interfaces that have IEEE 802.1Q tagging, flexible-ethernet-services, and bridging enabled and that must accept packets carrying TPID 0x8100 or a user-defined TPID.

vlan-ccc—Use Ethernet virtual LAN (VLAN) encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

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vlan-vci-ccc—Use ATM-to-Ethernet interworking encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

vlan-tcc—Use Ethernet VLAN encapsulation on TCC circuits. When you use this encapsulation type, you can configure the **tcc** family only.

vlan-vpls—Use Ethernet VLAN encapsulation on VPLS circuits.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring Layer 2 Switching Cross-Connects Using CCC*
- *Configuring the Encapsulation for Layer 2 Switching TCCs*
- *Configuring Interface Encapsulation on Logical Interfaces*
- *Configuring MPLS LSP Tunnel Cross-Connects Using CCC*
- *Circuit and Translational Cross-Connects Overview*
- *Identifying the Access Concentrator*
- *Configuring ATM Interface Encapsulation*
- *Configuring VLAN Encapsulation*
- *Configuring Extended VLAN Encapsulation*
- *Configuring ATM-to-Ethernet Interworking*
- *Configuring Interface Encapsulation on PTX Series Packet Transport Routers*
- *Configuring CCC Encapsulation for Layer 2 VPNs*
- *Configuring TCC Encapsulation for Layer 2 VPNs and Layer 2 Circuits*
- *Configuring ATM for Subscriber Access*
- *CoS on ATM IMA Pseudowire Interfaces Overview*
- *Configuring Policing on an ATM IMA Pseudowire*

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encapsulation (Physical Interface)

Syntax encapsulation (atm-ccc-cell-relay | atm-pvc | cisco-hdlc | cisco-hdlc-ccc | cisco-hdlc-tcc | ethernet-bridge | ethernet-ccc | ethernet-over-atm | ethernet-tcc | ethernet-vpls | ethernet-vpls-fr | ether-vpls-over-atm-llc | ethernet-vpls-ppp |extended-frame-relay-ccc | extended-frame-relay-ether-type-tcc | extended-frame-relay-tcc | extended-vlan-bridge | extended-vlan-ccc | extended-vlan-tcc | extended-vlan-vpls | flexible-ethernet-services | flexible-frame-relay | frame-relay | frame-relay-ccc | frame-relay-ether-type | frame-relay-ether-type-tcc | frame-relay-port-ccc | frame-relay-tcc | generic-services | multilink-frame-relay-uni-nni | ppp | ppp-ccc | ppp-tcc | vlan-ccc | vlan-vci-ccc | vlan-vpls);

Hierarchy Level [edit interfaces *interface-name*],
[edit interfaces rlsq *number:number*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 11.1 for EX Series switches.
Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers (**flexible-ethernet-services**, **ethernet-ccc**, and **ethernet-tcc** options only).

Description Specify the physical link-layer encapsulation type. Not all encapsulation types are supported on the switches. See the switch CLI.

Default **ppp**—Use serial PPP encapsulation.

Options **atm-ccc-cell-relay**—Use ATM cell-relay encapsulation.

atm-pvc—Use ATM PVC encapsulation.

cisco-hdlc—Use Cisco-compatible High-Level Data Link Control (HDLC) framing.

cisco-hdlc-ccc—Use Cisco-compatible HDLC framing on CCC circuits.

cisco-hdlc-tcc—Use Cisco-compatible HDLC framing on TCC circuits for connecting different media.

ethernet-bridge—Use Ethernet bridge encapsulation on Ethernet interfaces that have bridging enabled and that must accept all packets.

ethernet-ccc—Use Ethernet CCC encapsulation on Ethernet interfaces that must accept packets carrying standard Tag Protocol ID (TPID) values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, CCC is not supported.

ethernet-over-atm—For interfaces that carry IPv4 traffic, use Ethernet over ATM encapsulation. When you use this encapsulation type, you cannot configure multipoint interfaces. As defined in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*, this encapsulation type allows ATM interfaces to connect to devices that support only bridge protocol data units (BPDUs). Junos OS does not completely support bridging, but accepts BPDU packets as a default gateway. If you use the router as an edge device, then the router acts as a default gateway. It accepts Ethernet LLC/SNAP frames with IP or ARP in the payload, and drops the rest. For packets destined to the Ethernet LAN, a route lookup is done using the destination

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IP address. If the route lookup yields a full address match, the packet is encapsulated with an LLC/SNAP and MAC header, and the packet is forwarded to the ATM interface.

ethernet-tcc—For interfaces that carry IPv4 traffic, use Ethernet TCC encapsulation on interfaces that must accept packets carrying standard TPID values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, TCC is not supported.

ethernet-vpls—Use Ethernet VPLS encapsulation on Ethernet interfaces that have VPLS enabled and that must accept packets carrying standard TPID values. On M Series routers, except the M320 router, the 4-port Fast Ethernet TX PIC and the 1-port, 2-port, and 4-port, 4-slot Gigabit Ethernet PICs can use the Ethernet VPLS encapsulation type.

ethernet-vpls-fr—Use in a VPLS setup when a CE device is connected to a PE device over a time division multiplexing (TDM) link. This encapsulation type enables the PE device to terminate the outer Layer 2 Frame Relay connection, use the 802.1p bits inside the inner Ethernet header to classify the packets, look at the MAC address from the Ethernet header, and use the MAC address to forward the packet into a given VPLS instance.

ethernet-vpls-ppp—Use in a VPLS setup when a CE device is connected to a PE device over a time division multiplexing (TDM) link. This encapsulation type enables the PE device to terminate the outer Layer 2 PPP connection, use the 802.1p bits inside the inner Ethernet header to classify the packets, look at the MAC address from the Ethernet header, and use it to forward the packet into a given VPLS instance.

ether-vpls-over-atm-llc—For ATM intelligent queuing (IQ) interfaces only, use the Ethernet virtual private LAN service (VPLS) over ATM LLC encapsulation to bridge Ethernet interfaces and ATM interfaces over a VPLS routing instance (as described in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*). Packets from the ATM interfaces are converted to standard ENET2/802.3 encapsulated Ethernet frames with the frame check sequence (FCS) field removed.

extended-frame-relay-ccc—Use Frame Relay encapsulation on CCC circuits. This encapsulation type allows you to dedicate DLCIs 1 through 1022 to CCC.

extended-frame-relay-ether-type-tcc—Use extended Frame Relay ether type TCC for Cisco-compatible Frame Relay for DLCIs 1 through 1022. This encapsulation type is used for circuits with different media on either side of the connection.

extended-frame-relay-tcc—Use Frame Relay encapsulation on TCC circuits to connect different media. This encapsulation type allows you to dedicate DLCIs 1 through 1022 to TCC.

extended-vlan-bridge—Use extended VLAN bridge encapsulation on Ethernet interfaces that have IEEE 802.1Q VLAN tagging and bridging enabled and that must accept packets carrying TPID 0x8100 or a user-defined TPID.

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extended-vlan-ccc—Use extended VLAN encapsulation on CCC circuits with Gigabit Ethernet and 4-port Fast Ethernet interfaces that must accept packets carrying 802.1Q values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, extended VLAN CCC is not supported. For 4-port Gigabit Ethernet PICs, extended VLAN CCC is not supported.

extended-vlan-tcc—For interfaces that carry IPv4 traffic, use extended VLAN encapsulation on TCC circuits with Gigabit Ethernet interfaces on which you want to use 802.1Q tagging. For 4-port Gigabit Ethernet PICs, extended VLAN TCC is not supported.

extended-vlan-vpls—Use extended VLAN VPLS encapsulation on Ethernet interfaces that have VLAN 802.1Q tagging and VPLS enabled and that must accept packets carrying TPIDs 0x8100, 0x9100, and 0x9901. On M Series routers, except the M320 router, the 4-port Fast Ethernet TX PIC and the 1-port, 2-port, and 4-port, 4-slot Gigabit Ethernet PICs can use the Ethernet VPLS encapsulation type.

NOTE: **The built-in Gigabit Ethernet PIC on an M7i router does not support extended VLAN VPLS encapsulation.**

flexible-ethernet-services—For Gigabit Ethernet IQ interfaces and Gigabit Ethernet PICs with small form-factor pluggable transceivers (SFPs) (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), use flexible Ethernet services encapsulation when you want to configure multiple per-unit Ethernet encapsulations. Aggregated Ethernet bundles can use this encapsulation type. This encapsulation type allows you to configure any combination of route, TCC, CCC, Layer 2 virtual private networks (VPNs), and VPLS encapsulations on a single physical port. If you configure flexible Ethernet services encapsulation on the physical interface, VLAN IDs from 1 through 511 are no longer reserved for normal VLANs.

flexible-frame-relay—For IQ interfaces only, use flexible Frame Relay encapsulation when you want to configure multiple per-unit Frame Relay encapsulations. This encapsulation type allows you to configure any combination of TCC, CCC, and standard Frame Relay encapsulations on a single physical port. Also, each logical interface can have any DLCI value from 1 through 1022.

frame-relay—Use Frame Relay encapsulation.

frame-relay-ccc—Use Frame Relay encapsulation on CCC circuits.

frame-relay-ether-type—Use Frame Relay ether type encapsulation for compatibility with the Cisco Frame Relay.

frame-relay-ether-type-tcc—Use Frame Relay ether type TCC for Cisco-compatible Frame Relay on TCC circuits to connect different media.

frame-relay-port-ccc—Use Frame Relay port CCC encapsulation to transparently carry all the DLCIs between two customer edge (CE) routers without explicitly configuring each DLCI on the two provider edge (PE) routers with Frame Relay transport. When you use this encapsulation type, you can configure the **ccc** family only.

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frame-relay-tcc—Use Frame Relay encapsulation on TCC circuits to connect different media.

generic-services—Use generic services encapsulation for services with a hierarchical scheduler.

multilink-frame-relay-uni-nni—Use MLFR UNI NNI encapsulation. This encapsulation is used on link services, voice services interfaces functioning as FRF.16 bundles, and their constituent T1 or E1 interfaces, and is supported on LSQ and redundant LSQ interfaces.

ppp—Use serial PPP encapsulation.

ppp-ccc—Use serial PPP encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

ppp-tcc—Use serial PPP encapsulation on TCC circuits for connecting different media. When you use this encapsulation type, you can configure the **tcc** family only.

vlan-ccc—Use Ethernet VLAN encapsulation on CCC circuits.

vlan-vci-ccc—Use ATM-to-Ethernet interworking encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only. All logical interfaces configured on the Ethernet interface must also have the encapsulation type set to **vlan-vci-ccc**.

vlan-vpls—Use VLAN VPLS encapsulation on Ethernet interfaces with VLAN tagging and VPLS enabled. Interfaces with VLAN VPLS encapsulation accept packets carrying standard TPID values only. On M Series routers, except the M320 router, the 4-port Fast Ethernet TX PIC and the 1-port, 2-port, and 4-port, 4-slot Gigabit Ethernet PICs can use the Ethernet VPLS encapsulation type.

NOTE:

- Label-switched interfaces (LSIs) do not support VLAN VPLS encapsulation. Therefore, you can only use VLAN VPLS encapsulation on a PE-router-to-CE-router interface and not a core-facing interface.
- Starting with Junos OS release 13.3, a commit error occurs when you configure **vlan-vpls** encapsulation on a physical interface and configure **family inet** on one of the logical units. Previously, it was possible to commit this invalid configuration.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

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Related Documentation

- *Configuring Interface Encapsulation on Physical Interfaces*
- *Configuring CCC Encapsulation for Layer 2 VPNs*
- *Configuring Layer 2 Switching Cross-Connects Using CCC*
- *Configuring TCC Encapsulation for Layer 2 VPNs and Layer 2 Circuits*
- *Configuring ATM Interface Encapsulation*
- *Configuring ATM-to-Ethernet Interworking*
- *Configuring VLAN Encapsulation*
- *Configuring Extended VLAN Encapsulation*
- *Configuring Encapsulation for Layer 2 Wholesale VLAN Interfaces*
- *Configuring Interfaces for Layer 2 Circuits*
- *Configuring Interface Encapsulation on PTX Series Packet Transport Routers*
- *Configuring an MPLS-Based Layer 2 VPN (CLI Procedure)*
- *Configuring MPLS LSP Tunnel Cross-Connects Using CCC*
- *Configuring TCC*
- *Configuring VPLS Interface Encapsulation*
- *Configuring Interfaces for VPLS Routing*
- *Defining the Encapsulation for Switching Cross-Connects*
- *Configuring Q-in-Q Tunneling (CLI Procedure)*

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family

Syntax

```
family family {
    accounting {
        destination-class-usage;
        source-class-usage {
            (input | output | input output);
        }
    }
    access-concentrator name;
    address address {
        ... the address subhierarchy appears after the main [edit interfaces interface-name unit
            logical-unit-number family family-name] hierarchy ...
    }
    bundle interface-name;
    core-facing;
    demux-destination {
        destination-prefix;
    }
    demux-source {
        source-prefix;
    }
    direct-connect;
    duplicate-protection;
    dynamic-profile profile-name;
    filter {
        group filter-group-number;
        input filter-name;
        input-list [ filter-names ];
        output filter-name;
        output-list [ filter-names ];
    }
    interface-mode (access | trunk);
    ipsec-sa sa-name;
    keep-address-and-control;
    mac-validate (loose | strict);
    max-sessions number;
    max-sessions-vsa-ignore;
    mtu bytes;
    multicast-only;
    negotiate-address;
    no-redirects;
    policer {
        arp policer-template-name;
        input policer-template-name;
        output policer-template-name;
    }
    primary;
    protocols [inet iso mpls];
    proxy inet-address address;
    receive-options-packets;
    receive-ttl-exceeded;
    remote (inet-address address | mac-address address);
    rpf-check {
```

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```
    fail-filter filter-name
    mode loose;
}
sampling {
    input;
    output;
}
service {
    input {
        post-service-filter filter-name;
        service-set service-set-name <service-filter filter-name>;
    }
    output {
        service-set service-set-name <service-filter filter-name>;
    }
}
service-name-table table-name
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
    maximum-seconds>;
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
translate-plp-control-word-de;
unnumbered-address interface-name destination address destination-profile profile-name;
vlan-id number;
vlan-id-list [number number-number];
address address {
    arp ip-address (mac | multicast-mac) mac-address <publish>;
    broadcast address;
    destination address;
    destination-profile name;
    eui-64;
    master-only;
    multipoint-destination address dlci dlci-identifier;
    multipoint-destination address {
        epd-threshold cells;
        inverse-arp;
        oam-liveness {
            up-count cells;
            down-count cells;
        }
        oam-period (disable | seconds);
        shaping {
            (cbr rate | rtvbr burst length peak rate sustained rate | vbr burst length peak rate
                sustained rate);
            queue-length number;
        }
        vci vpi-identifier.vci-identifier;
    }
    preferred;
    primary;
    vrrp-groupgroup-id {
        (accept-data | no-accept-data);
        advertise-interval seconds;
        authentication-key key;
        authentication-type authentication;
        fast-interval milliseconds;
```


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```
        (preempt | no-preempt) {
          hold-time seconds;
        }
        priority number;
        track {
          interface interface-name {
            bandwidth-threshold bits-per-second priority-cost priority;
            priority-cost priority;
          }
          priority-hold-time seconds;
          route prefix routing-instance instance-name priority-cost priority;
          }
        }
        virtual-address [ addresses ];
        }
      virtual-link-local-address ipv6-address;
    }
}
```

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced before Junos OS Release 7.4.
Option **max-sessions-vsa-ignore** introduced in Junos OS Release 11.4.

Description Configure protocol family information for the logical interface.

NOTE: Not all subordinate stanzas are available to every protocol family.

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Options *family*—Protocol family:

- **any**—Protocol-independent family used for Layer 2 packet filtering

NOTE: This option is not supported on T4000 Type 5 FPCs.

- **bridge**—(M Series and T Series routers only) Configure only when the physical interface is configured with **ethernet-bridge** type encapsulation or when the logical interface is configured with **vlan-bridge** type encapsulation
- **ethernet-switching**—(M Series and T Series routers only) Configure only when the physical interface is configured with **ethernet-bridge** type encapsulation or when the logical interface is configured with **vlan-bridge** type encapsulation
- **ccc**—Circuit cross-connect protocol suite
- **inet**—Internet Protocol version 4 suite
- **inet6**—Internet Protocol version 6 suite
- **iso**—International Organization for Standardization Open Systems Interconnection (ISO OSI) protocol suite
- **mlfr-end-to-end**—Multilink Frame Relay FRF.15
- **mlfr-uni-nni**—Multilink Frame Relay FRF.16
- **multilink-ppp**—Multilink Point-to-Point Protocol
- **mpls**—Multiprotocol Label Switching (MPLS)
- **pppoe**—Point-to-Point Protocol over Ethernet
- **tcc**—Translational cross-connect protocol suite
- **tnp**—Trivial Network Protocol
- **vpls**—(M Series and T Series routers only) Virtual private LAN service

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring the Protocol Family*

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fast-aps-switch

Syntax fast-aps-switch;

Hierarchy Level [edit interfaces *interface-name* sonet-options aps]

Release Information Statement introduced in Junos OS Release 12.1.

Description (M320 routers with Channelized OC3/STM1 Circuit Emulation PIC with SFP only and EX Series switches) Reduce the Automatic Protection Switching (APS) switchover time in Layer 2 circuits.

NOTE:

- Configuring this statement reduces the APS switchover time only when the Layer 2 circuit encapsulation type for the interface receiving traffic from a Layer 2 circuit neighbor is SAToP.
- When the **fast-aps-switch** statement is configured in revertive APS mode, you must configure an appropriate value for revert time to achieve reduction in APS switchover time.
- To prevent the logical interfaces in the data path from being shut down, configure appropriate hold-time values on all the interfaces in the data path that support TDM.
- The **fast-aps-switch** statement cannot be configured when the APS **annex-b** option is configured.
- The interfaces that have the **fast-aps-switch** statement configured cannot be used in virtual private LAN service (VPLS) environments.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Reducing APS Switchover Time in Layer 2 Circuits*

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fcs

Syntax fcs (16 | 32);

Hierarchy Level [edit interfaces e1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* sonet-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description For E1/E3, SONET/SDH, and T1/T3 interfaces, configure the frame checksum (FCS) on the interface. The checksum must be the same on both ends of the interface.

On a channelized OC12 interface, the SONET/SDH **fcs** statement is not supported. To configure FCS on each DS3 channel, you must include the **t3-options fcs** statement in the configuration for each channel. For SONET/SDH, the channelized OC12 interface supports DS3 to STS-1 to OC12. For SDH, the channelized OC12 interface supports *N*xDS3 to *N*xVC3 to AU3 to STM.

NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **fcs** statement must be included at the **[edit interfaces e1-*fpc/pic/port*]** or **[edit interfaces t1-*fpc/pic/port*]** hierarchy level as appropriate.

Options **16**—Use a 16-bit frame checksum on the interface.

32—Use a 32-bit frame checksum on the interface. Using a 32-bit checksum provides more reliable packet verification, but some older equipment might not support 32-bit checksums.

Default: 16

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring the E1 Frame Checksum*
- *Configuring the E3 Frame Checksum*
- *Configuring the SONET/SDH Frame Checksum*
- *Configuring the T1 Frame Checksum*
- *Configuring the T3 Frame Checksum*

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feac-loop-respond

Syntax (feac-loop-respond | no-feac-loop-respond);

Hierarchy Level [edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description For T3 interfaces only, configure the router so a remote CSU can place the local router into loopback.

If you configure remote or local loopback with the T3 **loopback** statement, the router does not respond to FEAC requests from the CSU even if you include the **feac-loop-respond** statement in the configuration. For the router to respond, you must delete the **loopback** statement from the configuration.

You must rollback the setting done on the remote CSU prior to deactivating the **feac-loop-respond** statement. If the remote CSU cannot comply, clear the remote loop through local configuration to achieve the cleanup. For example, configure remote loopback on the interface and then delete the remote loopback.

Default The router does not respond to FEAC requests.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring the T3 FEAC Response*
- loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) on page 409
- *remote-loopback-respond*

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force

Syntax force (protect | working);

Hierarchy Level [edit interfaces *interface-name* sonet-options aps]

Release Information Statement introduced before Junos OS Release 7.4.

Description Perform a forced switch between the protect and working circuits. This statement is honored only if there are no higher-priority reasons to switch. It can be overridden by a signal failure on the protect circuit, thus causing a switch to the working circuit.

Options

protect—Request the circuit to become the protect circuit.

working—Request the circuit to become the working circuit.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring Switching Between the Working and Protect Circuits*
- request on page 421

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framing (E1, E3, and T1 Interfaces)

Syntax framing (g704 | g704-no-crc4 | g.751 | g.832 | unframed | sf | esf);

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces ct1-*fpc/pic/port*],
[edit interfaces at-*fpc/pic/port* e3-options],
[edit interfaces e1-*fpc/pic/port* e1-options],
[edit interfaces t1-*fpc/pic/port* t1-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure the framing format.

NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **framing** statement must be included at the **[edit interfaces ce1-*fpc/pic/port*]** or **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level as appropriate.

Default **esf** for T1 interfaces; **g704** for E1 interfaces. There is no default value for E3 over ATM interfaces.

Options **esf**—Extended superframe (ESF) mode for T1 interfaces.

g704—G.704 framing format for E1 interfaces.

g704-no-crc4—G.704 framing with no cyclic redundancy check 4 (CRC4) for E1 interfaces.

g.751—G.751 framing format for E3 over ATM interfaces.

g.832—G.832 framing format for E3 over ATM interfaces.

sf—Superframe (SF) mode for T1 interfaces.

unframed—Unframed mode for E1 interfaces.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring E1 Framing*
- *Configuring E3 and T3 Parameters on ATM Interfaces*
- *Configuring T1 Framing*

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hold-time (APS)

Syntax hold-time *milliseconds*;

Hierarchy Level [edit interfaces *interface-name* sonet-options aps]

Release Information Statement introduced before Junos OS Release 7.4.

Description Hold-time value to use to determine whether a neighbor APS router is operational.

Options ***milliseconds***—Hold-time value.
Range: 1 through 65,534 milliseconds
Default: 3000 milliseconds (3 times the advertisement interval)

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- *Configuring APS Timers*
- advertise-interval on page 369

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idle-cycle-flag

Syntax idle-cycle-flag *value*;

Hierarchy Level [edit interfaces e1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* serial-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure the value that the DS0, E1, E3, T1, or T3 interface transmits during idle cycles.

NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **idle-cycle-flag** statement must be included at the **[edit interfaces e1-*fpc/pic/port*]** or **[edit interfaces t1-*fpc/pic/port*]** hierarchy level as appropriate.

Options ***value***—Value to transmit in the idle cycles:

- **flags**—Transmit the value 0x7E.
- **ones**—Transmit the value 0xFF (all ones).

Default: Flags

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring the E1 Idle Cycle Flag*
- *Configuring the E3 Idle Cycle Flag*
- *Configuring the T1 Idle Cycle Flag*
- *Configuring the T3 Idle Cycle Flag*

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interface-type (Interfaces)

Syntax interface-type (bc | coc1 | ct1 | ct3 | dc | ds |so | t1 | t3);

Hierarchy Level [edit interfaces *interface-range name* no-partition],
[edit interfaces *interface-range name* partition *partition-number*],
[edit interfaces *interface-range name* partition *partition-number* oc-slice *oc-slice-range*],
[edit interfaces *interface-range name* partition *partition-number* timeslot *timeslot-range*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For IQ and IQE interfaces only, configure the sublevel interface type.

Options

bc—Dual—Port Channelized E1 and T1 ISDN PRI interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* timeslot *timeslot-range*]** hierarchy level to create a bearer (B) channel **bc-*pim*/0/*port*:*channel*** interface for each time you want to function as an ISDN PRI B-channel.

coc1—Channelized OC1 interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* oc-slice *oc-slice-range* interface-type coc12-*fpc/pic/port*]** hierarchy level.

ct1—Channelized T1 interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* interface-type ct3-*fpc/pic/port*<:*channel*>]** hierarchy level.

ct3—Channelized T3 interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* oc-slice *oc-slice-range* interface-type coc1-*fpc/pic/port*:*channel* no-partition]** hierarchy level.

dc—Dual-Port Channelized E1 and T1 ISDN PRI interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* timeslot *timeslot-range*]** hierarchy level to create a (D) channel **dc-*pim*/0/*port*** to control the B-channels.

ds—DS0 interface type. You can specify this interface type at the **[edit interfaces *interface-name*partition *partition-number* interface-type (ce1-*fpc/pic/port* | ct1-*fpc/pic/port*<:*channel*>)]** hierarchy level.

so—SONET/SDH interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* oc-slice *oc-slice-range* interface-type coc12-*fpc/pic/port*]** hierarchy level.

t1—T1 interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* oc-slice *oc-slice-range* interface-type (coc12-*fpc/pic/port* | coc1-*fpc/pic/port*)]** hierarchy level.

t3—T3 interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* oc-slice*oc-slice-range* interface-type (coc12-*fpc/pic/port* | coc1-*fpc/pic/port*:*channel* no-partition)]** hierarchy level.

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Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Channelized E1 IQ and IQE Interfaces Overview on page 29
- Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 133
- Configuring Channelized T3 IQ Interfaces on page 209

inverse-arp

Syntax
inverse-arp;

Hierarchy Level
[edit interfaces *interface-name* unit *logical-unit-number*],
[edit interfaces *interface-name* unit *logical-unit-number* family inet address *address* multipoint-destination *destination*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family inet address *address* multipoint-destination *destination*]

Release Information
Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 11.1 for the QFX Series.

Description
For ATM encapsulation, enable responses to receive inverse ATM ARP requests. For Frame Relay encapsulation, enable responses to receive inverse Frame Relay ARP requests.

Default
Inverse ARP is disabled on all ATM and Frame Relay interfaces.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- *Configuring Inverse ATM1 or ATM2 ARP*
- *Configuring Inverse Frame Relay ARP*

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invert-data

Syntax invert-data;

Hierarchy Level [edit interfaces e1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* e3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Invert the transmission of unused data bits on the DS0, E1, E3, and T1 interface.

NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **invert-data** statement must be included at the **[edit interfaces e1-*fpc/pic/port*]** or **[edit interfaces t1-*fpc/pic/port*]** hierarchy level as appropriate.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring E1 Data Inversion*
- *Configuring E3 Data Inversion*
- *Configuring T1 Data Inversion*

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isdn-options

Syntax

```
isdn-options {
  bchannel-allocation (ascending | descending);
  calling-number number;
  incoming-called-number number <reject>;
  spid1 spid-string;
  spid2 spid-string;
  static-tei-val value;
  switch-type (att5e | etsi | ni1 | ntdms100 | ntt);
  t310 seconds;
  tei-option (first-call | power-up);
}
```

Hierarchy Level

[edit interfaces br-*pim*/0/*port*],
[edit interfaces ct1-*pim*/0/*port*],
[edit interfaces ce1-*pim*/0/*port*]

Release Information

Statement introduced before Junos OS Release 7.4.
bchannel-allocation option added in Junos OS Release 8.3.

Description

For J Series Services Routers only. Specify the ISDN options for configuring ISDN interfaces for group and user sessions.

The statements are explained separately.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring ISDN Physical Interface Properties*
- Allocating B-Channels for Dialout on page 121
- *Junos OS Interfaces and Routing Configuration Guide*

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lmi-type

Syntax lmi-type (ansi | itu | c-lmi);

Hierarchy Level [edit interfaces *interface-name* lmi],
[edit interfaces *interface-name* mlfr-uni-nni-bundle-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description Set Frame Relay Local Management Interface (LMI) type.

NOTE: Consortium LMI is supported on all MPCs and I-chip based FPCs.

Options **ansi**—Use ANSI T1.167 Annex D LMIs.

itu—Use ITU Q933 Annex A LMIs.

c-lmi—Use Consortium LMI.
Default: ansi

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring Frame Relay Keepalives*
- *mlfr-uni-nni-bundle-options*
- *lmi (Frame Relay)*
- *Junos OS Services Interfaces Library for Routing Devices*

lockout

Syntax lockout;

Hierarchy Level [edit interfaces *interface-name* sonet-options aps]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure a lockout of protection, forcing the use of the working circuit and locking out the protect circuit regardless of anything else.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring Switching Between the Working and Protect Circuits*

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loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3)

Syntax loopback (local | payload | remote);

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces ct1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* dsl-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* shdsl-options},
[edit interfaces *interface-name* sonet-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure a loopback connection. To turn off the loopback capability, remove the **loopback** statement from the configuration.

NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **loopback** statement must be included with the **local** or **remote** option at the **[edit interfaces ce1-*fpc/pic/port*]** or **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level as appropriate.

When configuring T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **loopback** statement must be included with the **payload** option at the **[edit interfaces t1-*fpc/pic/port*]** hierarchy level.

NOTE: When configuring CE1 or CT1 interfaces on the 16-port Channelized E1/T1 MIC (MIC-3D-16CHE1-T1-CE), you must include the **loopback** statement at the **[edit interfaces ce1-*fpc/pic/port*]** hierarchy level, or **[edit interfaces ct1-*fpc/pic/port*]**

To configure loopback on channelized IQ and IQE PICs, SONET/SDH level, use the **sonet-options loopback** statement **local** and **remote** options at the controller interface (coc48, cstm16, coc12, cstm4, coc3, cstm1). It is ignored for path-level interfaces **so-*fpc/pic/port*** or **so-*fpc/pic/port*:*channel***.

Options **local**—Loop packets, including both data and timing information, back on the local router's PIC. *N*xDS0 IQ interfaces do not support local loopback.

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payload—For channelized T3, T1, and *N*xDS0 IQ interfaces only, loop back data only (without clocking information) on the remote router's PIC. With payload loopback, overhead is recalculated. Neither ATM-over-asymmetrical digital subscriber line (ADSL) interfaces nor ATM-over-SHDSL interfaces support payload loopback.

remote—Loop packets, including both data and timing information, back on the remote router's interface card. *N*xDS0 IQ interfaces do not support remote loopback.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring E3 and T3 Parameters on ATM Interfaces*
- *Configuring E1 Loopback Capability*
- *Configuring E3 Loopback Capability*
- *Configuring SONET/SDH Loopback Capability*
- *Configuring SHDSL Operating Mode on an ATM Physical Interface*
- *Configuring T1 Loopback Capability*
- *Configuring T3 Loopback Capability*
- feac-loop-respond on page 399

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mtu

Syntax mtu *bytes*;

Hierarchy Level
[edit interfaces *interface-name*],
[edit interfaces *interface-name* unit *logical-unit-number* family *family*],
[edit interfaces interface-range *name*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*],
[edit logical-systems *logical-system-name* protocols l2circuit local-switching interface *interface-name* backup-neighbor *address*],
[edit logical-systems *logical-system-name* protocols l2circuit neighbor *address* interface *interface-name*],
[edit logical-systems *logical-system-name* protocols l2circuit neighbor *address* interface *interface-name* backup-neighbor *address*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols l2vpn interface *interface-name*],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols vpls],
[edit protocols l2circuit local-switching interface *interface-name* backup-neighbor *address*],
[edit protocols l2circuit neighbor *address* interface *interface-name*]
[edit protocols l2circuit neighbor *address* interface *interface-name* backup-neighbor *address*],
[edit routing-instances *routing-instance-name* protocols l2vpn interface *interface-name*],
[edit routing-instances *routing-instance-name* protocols l2vpn site *site-name*],
[edit routing-instances *routing-instance-name* protocols vpls]

Release Information
Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Support for Layer 2 VPNs and VPLS introduced in Junos OS Release 10.4.
Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers.
Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.
Support at the **[set interfaces interface-name unit logical-unit-number family ccc]** hierarchy level introduced in Junos OS Release 12.3R3 for MX Series routers.

Description Specify the maximum transmission unit (MTU) size for the media or protocol. The default MTU size depends on the device type. Changing the media MTU or protocol MTU causes an interface to be deleted and added again.

To route jumbo data packets on an integrated routing and bridging (IRB) interface or routed VLAN interface (RVI) on EX Series switches, you must configure the jumbo MTU size on the member physical interfaces of the VLAN that you have associated with the IRB interface or RVI, as well as on the IRB interface or RVI itself (the interface named irb or vlan, respectively).

CAUTION: For EX Series switches, setting or deleting the jumbo MTU size on an IRB interface or RVI while the switch is transmitting packets might cause packets to be dropped.

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NOTE:

The MTU for an IRB interface is calculated by removing the Ethernet header overhead [6(DMAC)+6(SMAC)+2(EtherType)]. Because, the MTU is the lower value of the MTU configured on the IRB interface and the MTU configured on the IRB's associated bridge domain IFDs or IFLs, the IRB MTU is calculated as follows:

- In case of Layer 2 IFL configured with the **flexible-vlan-tagging** statement, the IRB MTU is calculated by including 8 bytes overhead (SVLAN+CVLAN).
- In case of Layer 2 IFL configured with the **vlan-tagging** statement, the IRB MTU is calculated by including a single VLAN 4 bytes overhead.

NOTE:

- If a packet whose size is larger than the configured MTU size is received on the receiving interface, the packet is eventually dropped. The value considered for MRU (maximum receive unit) size is also the same as the MTU size configured on that interface.
- Not all devices allow you to set an MTU value, and some devices have restrictions on the range of allowable MTU values. You cannot configure an MTU for management Ethernet interfaces (fxp0, em0, or me0) or for loopback, multilink, and multicast tunnel devices.
- On ACX Series routers, you can configure the protocol MTU by including the **mtu** statement at the **[edit interfaces** *interface-name* **unit** *logical-unit-number* **family inet]** or **[edit interfaces** *interface-name* **unit** *logical-unit-number* **family inet6]** hierarchy level.
  - If you configure the protocol MTU at any of these hierarchy levels, the configured value is applied to all families that are configured on the logical interface.
  - If you are configuring the protocol MTU for both **inet** and **inet6** families on the same logical interface, you must configure the same value for both the families. It is not recommended to configure different MTU size values for **inet** and **inet6** families that are configured on the same logical interface.

For more information about configuring MTU for specific interfaces and router or switch combinations, see *Configuring the Media MTU*.

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Options *bytes*—MTU size.

Range: 256 through 9192 bytes, 256 through 9216 (EX Series switch interfaces), 256 through 9500 bytes (Junos OS 12.1X48R2 for PTX Series routers)

Default: 1500 bytes (INET, INET6, and ISO families), 1448 bytes (MPLS), 1514 bytes (EX Series switch interfaces)

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring Gigabit Ethernet Interfaces (CLI Procedure)*
- *Configuring the Media MTU*
- *Configuring the MTU for Layer 2 Interfaces*
- *Setting the Protocol MTU*

multicast-dlci

Syntax multicast-dlci *dlci-identifier*;

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For point-to-multipoint Frame Relay, link services, and voice services interfaces only, enable multicast support on the interface. You can configure multicast support on the interface if the Frame Relay switch performs multicast replication.

Options ***dlci-identifier***—DLCI identifier, a number from 16 through 1022 that defines the Frame Relay DLCI over which the switch expects to receive multicast packets for replication.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring a Multicast-Capable Frame Relay Connection*
- dlci on page 382
- multipoint-destination on page 414
- *Junos OS Services Interfaces Library for Routing Devices*

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multipoint-destination

Syntax

```
multipoint-destination address dlci dlci-identifier;
multipoint-destination address {
  epd-threshold cells;
  inverse-arp;
  oam-liveness {
    down-count cells;
    up-count cells;
  }
  oam-period (disable | seconds);
  shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
      length);
    queue-length number;
  }
  vci vpi-identifier.vci-identifier;
}
```

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* family *family* address *address*], [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family* address *address*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For point-to-multipoint Frame Relay or ATM interfaces only, enable the support of multicast on the interface. You can configure multicast support on the interface if the Frame Relay or ATM switch performs multicast replication.

Options

address—Address of the remote side of the point-to-multipoint connection.

dlci-identifier—For Frame Relay interfaces, the data-link connection identifier.

Range: 0 through 0xFFFFFF (24 bits)

vci-identifier—For ATM interfaces, the virtual circuit identifier.

Range: 0 through 16,384

vpi-identifier—For ATM interfaces, the virtual path identifier.

Range: 0 through 255

Default: 0

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring a Point-to-Point ATM1 or ATM2 IQ Connection*
- *Configuring a Point-to-Multipoint Frame Relay Connection*
- dlci on page 382
- encapsulation (Logical Interface) on page 384

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neighbor (Automatic Protection Switching for SONET/SDH)

Syntax neighbor *address*;

Hierarchy Level [edit interfaces *interface-name* sonet-options aps]

Release Information Statement introduced before Junos OS Release 7.4.

Description If you are configuring one router to be the working router and a second to be the protect router, configure the address of the remote interface. You configure this on one or both of the interfaces.

The address you specify for the neighbor must never be routed through the interface on which APS is configured, or instability will result. We strongly recommend that you directly connect the working and protect routers and that you configure the interface address of this shared network as the neighbor address.

Options ***address***—Neighbor's address.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring Basic Automatic Protect Switching*

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no-keepalives

Syntax no-keepalives;

Hierarchy Level [edit interfaces *interface-name*],
[edit interfaces *interface-name* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Disable the sending of keepalives on a physical interface configured with PPP, Frame Relay, or Cisco HDLC encapsulation. The default keepalive interval is 10 seconds.

For ATM2 IQ interfaces only, you can disable keepalives on a logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:

- **atm-ppp-llc**—PPP over AAL5 LLC encapsulation.
- **atm-ppp-vc-mux**—PPP over AAL5 multiplex encapsulation.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring Keepalives*
- *Disabling the Sending of PPPoE Keepalive Messages*
- *Configuring Frame Relay Keepalives*

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no-partition

Syntax no-partition interface-type (e1 | (cau4 | so) | (ct3 | t3) | so | t3);

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces coc1-*fpc/pic/port*:*channel*],
[edit interfaces coc12-*fpc/pic/port*],
[edit interfaces cstm1-*fpc/pic/port*],
[edit interfaces ct3-*fpc/pic/port*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For Channelized E1 IQ PICs only, configure the channelized E1 interface as an unpartitioned, clear channel.

For Channelized OC12 PIC only, convert the channelized OC1 IQ interface into a channelized T3 interface or a T3 interface. You perform this configuration task for C-bit parity and M13-mapped configurations.

For Channelized OC12 IQ PICs only, configure the channelized OC12 interface as an unpartitioned, clear channel.

For Channelized STM1 PIC only, convert the channelized STM1 IQ interface into a channelized Administrative Unit 4 (AU-4) interface or a SONET/SDH STM1 interface.

For Channelized DS3 PIC only, configure the channelized T3 interface as an unpartitioned, clear channel.

Default If you do not include either this statement or the **partition** statement, the Channelized IQ PIC is not partitioned, and no data channels are configured.

Options The option used must correspond to the physical interface type:

e1—E1 interface type.

coc12 so—Channelized OC12 interface type, in SONET mode.

cau4—Channelized AU-4 interface type.

cstm1—SONET/SDH STM1 interface type, in SDH mode.

ct3—Channelized T3 interface type.

t3—T3 interface type.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Channelized E1 IQ and IQE Interfaces Overview on page 29
- Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 133
- Configuring an OC12/STM4 Interface on page 138

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- Configuring Channelized STM1 IQ and IQE Interfaces on page 193
- Configuring T3 IQ Interfaces on page 209
- **partition on page 420**
- *no-partition*

no-termination-request

Syntax no-termination-request;

Hierarchy Level [edit interfaces *interface-name* ppp-options],
[edit interfaces lsq-*fpc/pic/port* lsq-failure-options]

Release Information Statement introduced in Junos OS Release 7.4.
Support at the **[edit interfaces *interface-name* ppp-options]** hierarchy level added in Junos OS Release 8.3.

Description For LSQ PICs or link PICs in redundant LSQ configurations, you can inhibit the router from sending PPP termination-request messages to the remote host if the PIC fails.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Link PIC Failover on Channelized OC3 IQ and IQE Interfaces on page 130
- Configuring Link PIC Failover on Channelized OC12/STM4 IQ and IQE Interfaces on page 163
- Configuring Link PIC Failover on Channelized STM1 Interfaces on page 199
- *Junos OS Services Interfaces Library for Routing Devices*

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oc-slice

Syntax oc-slice *oc-slice-range*;

Hierarchy Level [edit interfaces *interface-name* partition *partition-number*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For channelized OC12 IQ interfaces only, configure the range of SONET/SDH slices.

Default If you do not include either this statement or the **no-partition** statement, the Channelized OC12 IQ PICs not partitioned, and no data channels are configured.

Options ***oc-slice-range***—Range of SONET/SDH slices. OC3 interfaces must occupy three consecutive OC slices per interface, in the form 1–3, 4–6, 7–9, or 10–12. The T3, T1, and DS0 interface types each occupy one OC slice per interface.

Range: For OC3 interfaces,1–3, 4–6, 7–9, or 10–12; for SONET/SDH and T3 interfaces, 1–12

The remaining statement is explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 133

paired-group

Syntax paired-group *group-name*;

Hierarchy Level [edit interfaces *interface-name* sonet-options aps]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure load sharing between two working protect circuit pairs.

Options ***group-name***—Circuit's group name, as configured with the **protect-circuit** or **working-circuit** statement.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- *Configuring APS Load Sharing*
- working-circuit on page 437

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partition

Syntax partition *partition-number* oc-slice *oc-slice-range* interface-type *type* timeslots *time-slot-range*;

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For IQ interfaces and J Series interfaces on the Dual-Port Channelized E1 and T1PIM, configure the channelized interface partition. The partition number is correlated with the channel number. Partition and channel numbering on IQ interfaces begins with **:1**, not **:0**.

Default If you omit this statement, the channelized PIC or PIM is not partitioned, and no data channels are configured.

Options ***partition-number***—Sublevel interface partition index.

Range:

- 1 through 4 for an OC3 interface on a channelized OC12 IQ interface.
- 1 through 12 for a T3 interface on a channelized OC12 IQ interface.
- 1 through 4 for a T3 interface on a channelized T3 IQ interface.
- 1 through 28 for a T1 IQ interface on a channelized OC12 IQ or channelized T3 IQ interface.
- 1 through 10 for an E1 interface on a channelized E1 IQ interface.
- 1 through 30 on a channelized E1 interface.
- 1 through 23 on a channelized T1 interface.
- 1 through 24 for *N*xDS0 interfaces on either channelized OC12 IQ or channelized DS3 IQ interfaces.
- 0 through 31(with 0 reserved for framing) for *N*xDS0 interfaces on channelized E1 IQ interfaces.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Channelized E1 IQ and IQE Interfaces Overview on page 29
- Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 133
- Configuring Channelized T3 IQ Interfaces on page 209
- no-partition on page 417

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protect-circuit

Syntax protect-circuit *group-name*;

Hierarchy Level [edit interfaces *interface-name* sonet-options aps]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure the protect router in an APS circuit pair. When the working interface fails, APS brings up the protection circuit and the traffic is moved to the protection circuit.

Options ***group-name***—Circuit's group name.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- *Configuring Basic Automatic Protect Switching*
- working-circuit on page 437

request

Syntax request (protect | working);

Hierarchy Level [edit interfaces *interface-name* sonet-options aps]

Release Information Statement introduced before Junos OS Release 7.4.

Description Perform a manual switch between the protect and working circuits. This statement is honored only if there are no higher-priority reasons to switch.

Options **protect**—Request that the circuit become the protect circuit.

working—Request that the circuit become the working circuit.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- *Configuring Switching Between the Working and Protect Circuits*
- force on page 400

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revert-time (Interfaces)

Syntax revert-time *seconds*;

Hierarchy Level [edit interfaces *interface-name* sonet-options aps]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure APS revertive mode.

Default APS operates in nonrevertive mode.

Options ***seconds***—Amount of time to wait after the working circuit has again become functional before making the working circuit active again.

Range: 1 through 65,535 seconds

Default: None (APS operates in nonrevertive mode)

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring Revertive Mode*

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sonet-options

Syntax

```
sonet-options {
  aps {
    advertise-interval milliseconds;
    annex-b
    authentication-key key;
    (break-before-make | no-break-before-make);
    fast-aps-switch;
    force;
    hold-time milliseconds;
    lockout;
    neighbor address;
    paired-group group-name;
    protect-circuit group-name;
    request;
    revert-time seconds;
    switching-mode (bidirectional | unidirectional);
    working-circuit group-name;
  }
  bytes {
    c2 value;
    e1-quiet value;
    f1 value;
    f2 value;
    s1 value;
    z3 value;
    z4 value;
  }
  fcs (16 | 32);
  loopback (local | remote);
  mpls {
    pop-all-labels {
      required-depth number;
    }
  }
  path-trace trace-string;
  (payload-scrambler | no-payload-scrambler);
  rfc-2615;
  trigger {
    defect ignore;
    defect hold-time up milliseconds down milliseconds;
  }
}
vtmapping (itu-t | klm);
(z0-increment | no-z0-increment);
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure SONET/SDH-specific interface properties.

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On SONET/SDH OC48 interfaces that you configure for channelized (multiplexed) mode (by including the **no-concatenate** statement at the **[edit chassis fpc *slot-number* pic *pic-number*]** hierarchy level), the **bytes e1-quiet** and **bytes f1** options have no effect. The **bytes f2**, **bytes z3**, **bytes z4**, and **path-trace** options work correctly on channel 0 and work in the transmit direction only on channels 1, 2, and 3.

On a channelized OC12 interface, the **bytes e1-quiet, bytes f1, bytes f2, bytes z3,** and **bytes z4** options are not supported. The **fcs** and **payload-scrambler** statements are also not supported; you must configure these for each DS3 channel using the **t3-options fcs** and **t3-options payload-scrambler** statements. The **aps** and **loopback** statements are supported only on channel 0 and are ignored if included in the configurations for channels 1 through 11. You can configure loopbacks for each DS3 channel with the **t3-options loopback** statement. The **path-trace** statement can be included in the configuration for each DS3 channel, thereby configuring a unique path trace for each channel.

To configure loopback on channelized IQ and IQE PICs, SONET/SDH level, use the **loopback** statement **local** and **remote** options at the controller interface (coc48, cstm16, coc12, cstm4, coc3, and cstm1). It is ignored for path-level interfaces **so-*fpc/pic/port*** or **so-*fpc/pic/port*:*channel***.

If you are running Intermediate System-to-Intermediate System (IS-IS) over SONET/SDH interfaces, use PPP if you are running Cisco IOS Release 12.0 or later. If you need to run HDLC, configure an ISO family MTU of 4469 on the router.

The statements are explained separately.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring SONET/SDH Parameters on ATM Interfaces*
- Channelized OC12/STM4 IQ and IQE Interfaces Overview on page 133
- Channelized STM1 Interfaces Overview on page 183
- *SONET/SDH Physical Interface Properties Overview*
- *no-concatenate*

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start-end-flag

Syntax start-end-flag (filler | shared);

Hierarchy Level [edit interfaces e1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description For DS0, E1, E3, T1, and T3 interfaces, configure the interface to share the transmission of start and end flags.

NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the **start-end-flag** statement must be included at the **[edit interfaces e1-*fpc/pic/port*]** or **[edit interfaces t1-*fpc/pic/port*]** hierarchy level as appropriate.

Options **filler**—Wait two idle cycles between the start and end flags.

shared—Share the transmission of the start and end flags. This is the default.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring E1 Start and End Flags*
- *Configuring the E3 Start and End Flags*
- *Configuring T1 Start and End Flags*
- *Configuring T3 Start and End Flags*

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switching-mode

Syntax switching-mode (bidirectional | unidirectional);

Hierarchy Level [edit interfaces *interface-name* sonet-options aps]

Release Information Statement introduced before Junos OS Release 7.4.

Description For unchannelized OC3, OC12, and OC48 SONET/SDH interfaces on T Series routers only, configure the interface to interoperate with SONET/SDH line-terminating equipment (LTE) that is provisioned for unidirectional linear APS in 1+1 architecture.

Default If the **switching-mode** statement is not configured, the mode is bidirectional, and the interface does not interoperate with a unidirectional SONET/SDH LTE.

Options **bidirectional**—Support bidirectional mode only.

unidirectional—Interoperate with a SONET/SDH LTE provisioned for unidirectional mode.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring Switching Mode*

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t1-options

Syntax

```
t1-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  buildout value;
  byte-encoding (nx56 | nx64);
  crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);
  crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);
  fcs (16 | 32);
  framing (esf | sf);
  idle-cycle-flag (flags | ones);
  invert-data;
  line-encoding (ami | b8zs);
  loopback (local | payload | remote);
  remote-loopback-respond;
  start-end-flag (filler | shared);
  timeslots time-slot-range;
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure T1-specific physical interface properties.

The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *T1 Interfaces Overview*

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t3-options

Syntax

```
t3-options {
  atm-encapsulation (direct | plcp);
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  (cbit-parity | no-cbit-parity);
  compatibility-mode (digital-link | kentrox | larscom) <subrate value>;
  fcs (16 | 32);
  (feac-loop-respond | no-feac-loop-respond);
  idle-cycle-flag value;
  (long-buildout | no-long-buildout);
  (loop-timing | no-loop-timing);
  loopback (local | payload | remote);
  start-end-flag value;
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure T3-specific physical interface properties, including the properties of DS3 channels on a channelized OC12 interface. The **long-buildout** statement is not supported for DS3 channels on a channelized OC12 interface.

On T3 interfaces, the default encapsulation is PPP.

For ATM1 interfaces, you can configure a subset of E3 options statements.

The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *T3 Interfaces Overview*

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timeslots

Syntax timeslots *time-slot-range*;

Hierarchy Level [edit interfaces e1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* partition *partition-number*],
[edit interfaces *interface-name* t1-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description For E1 and T1interfaces, allocate the specific time slots by number.

NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the **timeslots** statement must be included at the **[edit interfaces e1-*fpc/pic/port*]** or **[edit interfaces t1-*fpc/pic/port*]** hierarchy level as appropriate.

Options ***time-slot-range***—Actual time slot numbers allocated:

Range: Ranges vary by interface type and configuration option as follows:

- 1 through 24 for T1 interfaces (0 is reserved)
- 1 through 31 for 4-port E1 PICs (0 is reserved)
- 1 through 31 for *Nx*DS0 interfaces (0 is reserved)
- 2 through 32 for 10-port Channelized E1 and 10-port Channelized E1 IQ PICs (1 is reserved)
- 2 through 32 for the setting under **e1-options** with IQE PICs (1 is reserved) (when creating fractional E1)
- 1 through 31 for the setting under **partition** with IQE PICs (0 is reserved) (when creating *Nx*DS0)

NOTE: When creating fractional E1 interfaces only, if you connect a 4-port E1 PIC interface to a device that uses time slot numbering from 2 through 32, you must subtract 1 from the configured number of time slots.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Fractional E1 IQ and IQE Interfaces on page 33
- Configuring Fractional T1 IQ and IQE Interfaces on page 210

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- *Configuring Fractional E1 Time Slots*
- *Configuring Fractional T1 Time Slots*
- Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots on page 116

translate-discard-eligible

Syntax (translate-discard-eligible | no-translate-discard-eligible);

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* family ccc],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family ccc]

Release Information Statement introduced before Junos OS Release 7.4.

Description For interfaces with encapsulation type Frame Relay CCC, enable or disable translation of Frame Relay discard eligible (DE) control bits.

Default DE bit translation is disabled.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- *Configuring Frame Relay Control Bit Translation*

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unit

Syntax

```
unit logical-unit-number {
  accept-source-mac {
    mac-address mac-address {
      policer {
        input cos-policer-name;
        output cos-policer-name;
      }
    }
  }
  accounting-profile name;
  advisory-options {
    downstream-rate rate;
    upstream-rate rate;
  }
  allow-any-vci;
  atm-scheduler-map (map-name | default);
  backup-options {
    interface interface-name;
  }
  bandwidth rate;
  cell-bundle-size cells;
  clear-dont-fragment-bit;
  compression {
    rtp {
      maximum-contexts number <force>;
      f-max-period number;
      queues [queue-numbers];
      port {
        minimum port-number;
        maximum port-number;
      }
    }
  }
  compression-device interface-name;
  copy-tos-to-outer-ip-header;
  demux-destination family;
  demux-source family;
  demux-options {
    underlying-interface interface-name;
  }
  description text;
  interface {
    l2tp-interface-id name;
    (dedicated | shared);
  }
  dialer-options {
    activation-delay seconds;
    callback;
    callback-wait-period time;
    deactivation-delay seconds;
    dial-string [dial-string-numbers];
    idle-timeout seconds;
```

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```
    incoming-map {
      caller caller-id) | accept-all;
      initial-route-check seconds;
      load-interval seconds;
      load-threshold percent;
      pool pool-name;
      redial-delay time;
      watch-list {
        [routes];
      }
    }
}
disable;
disable-mlppp-inner-ppp-pfc;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
  activation-priority priority;
  bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
family family-name {
  ... the family subhierarchy appears after the main [edit interfaces interface-name unit
    logical-unit-number] hierarchy ...
}
fragment-threshold bytes;
inner-vlan-id-range start start-id end end-id;
input-vlan-map {
  (pop | pop-pop | pop-swap | push | push-push | swap |
  swap-push | swap-swap);
  inner-tag-protocol-id tpid;
  inner-vlan-id number;
  tag-protocol-id tpid;
  vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
  input-policer policer-name;
  input-three-color policer-name;
  output-policer policer-name;
  output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
  up-count cells;
  down-count cells;
}
oam-period (disable | seconds);
```


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```
output-vlan-map {
  (pop | pop-pop | pop-swap | push | push-push | swap |
  swap-push | swap-swap);
  inner-tag-protocol-id tpid;
  inner-vlan-id number;
  tag-protocol-id tpid;
  vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
  chap {
    access-profile name;
    default-chap-secret name;
    local-name name;
    passive;
  }
  compression {
    acfc;
    pfc;
  }
  dynamic-profile profile-name;
  lcp-restart-timer milliseconds;
  loopback-clear-timer seconds;
  ncp-restart-timer milliseconds;
  pap {
    access-profile name;
    default-pap-password password;
    local-name name;
    local-password password;
    passive;
  }
}
pppoe-options {
  access-concentrator name;
  auto-reconnect seconds;
  (client | server);
  service-name name;
  underlying-interface interface-name;
}
pppoe-underlying-options {
  access-concentrator name;
  direct-connect;
  dynamic-profile profile-name;
  max-sessions number;
}
proxy-arp;
service-domain (inside | outside);
shaping {
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
    length);
  queue-length number;
}
short-sequence;
```

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```
targeted-distribution;
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
  backup-destination address;
  destination address;
  key number;
  routing-instance {
    destination routing-instance-name;
  }
  source source-address;
  ttl number;
}
vci vpi-identifier.vci-identifier;
vci-range start start-vci end end-vci;
vpi vpi-identifier;
vlan-id number;
vlan-id-range number-number;
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
family family {
  accounting {
    destination-class-usage;
    source-class-usage {
      (input | output | input output);
    }
  }
  access-concentrator name;
  address address {
    ... the address subhierarchy appears after the main [edit interfaces interface-name unit
      logical-unit-number family family-name] hierarchy ...
  }
  bundle interface-name;
  core-facing;
  demux-destination {
    destination-prefix;
  }
  demux-source {
    source-prefix;
  }
  direct-connect;
  duplicate-protection;
  dynamic-profile profile-name;
  filter {
    group filter-group-number;
    input filter-name;
    input-list [filter-names];
    output filter-name;
    output-list [filter-names];
  }
  interface-mode (access | trunk);
  ipsec-sa sa-name;
  keep-address-and-control;
  mac-validate (loose | strict);
  max-sessions number;
```


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```
mtu bytes;
multicast-only;
no-redirects;
policer {
  arp policer-template-name;
  input policer-template-name;
  output policer-template-name;
}
primary;
protocols [inet iso mpls];
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check {
  fail-filter filter-name
  mode loose;
}
sampling {
  input;
  output;
}
service {
  input {
    post-service-filter filter-name;
    service-set service-set-name <service-filter filter-name>;
  }
  output {
    service-set service-set-name <service-filter filter-name>;
  }
}
service-name-table table-name
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
translate-plp-control-word-de;
unnumbered-address interface-name destination address destination-profile profile-name;
vlan-id number;
vlan-id-list [number number-number];
address address {
  arp ip-address (mac | multicast-mac) mac-address <publish>;
  broadcast address;
  destination address;
  destination-profile name;
  eui-64;
  master-only;
  multipoint-destination address {
    dlci dlci-identifier;
    epd-threshold cells <plp1 cells>;
    inverse-arp;
    oam-liveness {
      up-count cells;
      down-count cells;
    }
    oam-period (disable | seconds);
    shaping {
```

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```
            (cbr rate | rtvbr burst length peak rate sustained rate | vbr burst length peak rate
              sustained rate);
            queue-length number;
          }
          vci vpi-identifier.vci-identifier;
        }
        preferred;
        primary;
        (vrrp-group | vrrp-inet6-group) group-number {
          (accept-data | no-accept-data);
          advertise–interval seconds;
          authentication-type authentication;
          authentication-key key;
          fast-interval milliseconds;
          (preempt | no-preempt) {
            hold-time seconds;
          }
          priority number;
          track {
            interface interface-name {
              bandwidth-threshold bits-per-second priority-cost number;
            }
            priority-hold-time seconds;
            route ip-address/prefix-length routing-instance instance-name priority-cost cost;
          }
          virtual-address [addresses];
          virtual-link-local-address ipv6–address;
          vrrp-inherit-from {
            active-interface interface-name;
            active-group group-number;
          }
        }
      }
    }
  }
}
```

Hierarchy Level [edit interfaces *interface-name*],
[edit logical-systems *logical-system-name* interfaces *interface-name*],
[edit interfaces interface-set *interface-set-name* interface *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure a logical interface on the physical device. You must configure a logical interface to be able to use the physical device.

Options ***logical-unit-number***—Number of the logical unit.

Range: 0 through 1,073,741,823 for demux and PPPoE static interfaces. 0 through 16,385 for all other static interface types.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

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vtmapping

Syntax vtmapping (itu-t | klm);

Hierarchy Level [edit interfaces *interface-name* sonet-options];
[edit chassis fpc *number* pic *number*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For the Channelized STM1 IQ PIC or Channelized STM1 PIC, configure virtual tributary mapping.

For the Channelized STM1 PIC, you configure virtual tributary mapping at the **[edit chassis fpc *number* pic *number*]** hierarchy level.

Options **itu-t**—International Telephony Union standard.

klm—KLM standard.
Default: klm

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring Virtual Tributary Mapping of Channelized STM1 Interfaces on page 185
- *Configuring the Junos OS to Support Channelized STM1 Interface Virtual Tributary Mapping*

working-circuit

Syntax working-circuit *group-name*;

Hierarchy Level [edit interfaces *interface-name* sonet-options aps]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure the working router in an APS circuit pair.

Options ***group-name***—Circuit's group name.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- *Configuring Basic Automatic Protect Switching*
- protect-circuit on page 421

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line-encoding

Syntax line-encoding (ami | b8zs);

Hierarchy Level [edit interfaces ct1-*fpc/pic/port*],
[edit interfaces *interface-name* t1-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Set the line encoding format on the T1 interface.

NOTE: When configuring CT1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the **line-encoding** statement must be included at the **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level.

Default The default line encoding is B8ZS.

Options **ami**—Use Alternate Mark Inversion (AMI) line encoding.

b8zs—Use bipolar with 8-zeros substitution (B8ZS) line encoding.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring T1 Line Encoding*

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start-end-flag

Syntax start-end-flag (filler | shared);

Hierarchy Level [edit interfaces e1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description For DS0, E1, E3, T1, and T3 interfaces, configure the interface to share the transmission of start and end flags.

NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the **start-end-flag** statement must be included at the **[edit interfaces e1-*fpc/pic/port*]** or **[edit interfaces t1-*fpc/pic/port*]** hierarchy level as appropriate.

Options **filler**—Wait two idle cycles between the start and end flags.

shared—Share the transmission of the start and end flags. This is the default.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring E1 Start and End Flags*
- *Configuring the E3 Start and End Flags*
- *Configuring T1 Start and End Flags*
- *Configuring T3 Start and End Flags*

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ds0-options

Syntax

```
ds0-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  byte-encoding (nx56 | nx64);
  fcs (16 | 32);
  idle-cycle-flag (flags | ones);
  invert-data;
  loopback payload;
  start-end-flag (filler | shared);
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure DS0-specific physical interface properties.

The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Channelized DS3-to-DS0 Interfaces on page 213

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long-buildout

Syntax (long-buildout | no-long-buildout);

Hierarchy Level [edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure the T3 line buildout. A T3 interface has two settings for the T3 line buildout: a short setting, which is less than 255 feet (68 meters), and a long setting, which is greater than 255 feet and shorter than 450 feet (137 meters).

This statement applies to copper-cable-based T3 interfaces only. You cannot configure a line buildout for a DS3 channel on a channelized OC12 interface, which runs over fiber-optic cable.

Default A T3 interface uses the short line buildout setting (**no-long-buildout**) for wires shorter than 255 feet (68 meters).

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring the T3 Line Buildout*

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start-end-flag

Syntax start-end-flag (filler | shared);

Hierarchy Level [edit interfaces e1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description For DS0, E1, E3, T1, and T3 interfaces, configure the interface to share the transmission of start and end flags.

NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the **start-end-flag** statement must be included at the **[edit interfaces e1-*fpc/pic/port*]** or **[edit interfaces t1-*fpc/pic/port*]** hierarchy level as appropriate.

Options **filler**—Wait two idle cycles between the start and end flags.

shared—Share the transmission of the start and end flags. This is the default.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring E1 Start and End Flags*
- *Configuring the E3 Start and End Flags*
- *Configuring T1 Start and End Flags*
- *Configuring T3 Start and End Flags*

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CHAPTER 16

Operational Commands

- show class-of-service interface
- show class-of-service forwarding-table
- show interfaces (Channelized DS3-to-DS0)
- show interfaces (Channelized DS3-to-DS1)
- show interfaces (Channelized E1 IQ)
- show interfaces (Channelized E1)
- show interfaces (Channelized OC12 IQ and IQE)
- show interfaces (Channelized OC12)
- show interfaces (Channelized OC3 IQ and IQE)
- show interfaces (Channelized STM1 IQ)
- show interfaces (Channelized STM1)
- show interfaces (Channelized T1 IQ)
- show interfaces (Channelized T3 IQ)
- show interfaces (Channelized E1)
- show interfaces (Channelized E1 IQ)
- show interfaces (T1, E1, or DS)
- show interfaces (Channelized E1)
- show interfaces (Channelized E1 IQ)
- show interfaces (Channelized T1 IQ)
- show interfaces (T1, E1, or DS)
- show interfaces (Channelized OC12)
- show interfaces (Channelized OC12 IQ and IQE)
- show interfaces (Channelized OC3 IQ and IQE)
- show interfaces controller (Channelized OC3 IQ and IQE)
- show interfaces (Aggregated SONET/SDH)
- show interfaces (Channelized DS3-to-DS0)
- show interfaces (Channelized DS3-to-DS1)
- show interfaces (Channelized E1 IQ)

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- show interfaces (Channelized E1)
- show interfaces (Channelized OC12 IQ and IQE)
- show interfaces (Channelized OC12)
- show interfaces (Channelized OC3 IQ and IQE)
- show interfaces (Channelized OC48 IQ and IQE)
- show interfaces (Channelized STM1 IQ)
- show interfaces (Channelized STM1)
- show interfaces (Channelized T1 IQ)
- show interfaces (Channelized T3 IQ)
- show interfaces (SONET/SDH)
- show interfaces (T1, E1, or DS)
- show interfaces (T3 or E3)
- show interfaces (Channelized STM1)
- show interfaces (Channelized T1 IQ)
- show interfaces (T1, E1, or DS)
- show interfaces (Channelized DS3-to-DS0)
- show interfaces (Channelized DS3-to-DS1)
- show interfaces (Channelized T3 IQ)
- show interfaces (T1, E1, or DS)
- show interfaces (Channelized T1 IQ)
- show interfaces (T3 or E3)
- show interfaces controller (Channelized E1 IQ)
- show interfaces controller (Channelized OC12 IQ and IQE)
- show interfaces controller (Channelized OC3 IQ and IQE)
- show interfaces controller (Channelized STM1 IQ)
- show interfaces controller (Channelized T1 IQ)
- show interfaces controller (Channelized T3 IQ)

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show class-of-service interface

Syntax show class-of-service interface
<**comprehensive** | **detail**> <*interface-name*>

Release Information Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
Forwarding class map information added in Junos OS Release 9.4.
Command introduced in Junos OS Release 11.1 for the QFX Series.
Command introduced in Junos OS Release 12.1 for the PTX Series Packet Transport Routers.
Command introduced in Junos OS Release 12.2 for the ACX Series Universal Access routers.
Options **detail** and **comprehensive** introduced in Junos OS Release 11.4.

Description Display the logical and physical interface associations for the classifier, rewrite rules, and scheduler map objects.

Options **none**—Display CoS associations for all physical and logical interfaces.

comprehensive—(M Series, MX Series, and T Series routers) (Optional) Display comprehensive quality-of-service (QoS) information about all physical and logical interfaces.

detail—(M Series, MX Series, and T Series routers) (Optional) Display QoS and CoS information based on the interface.

If the **interface** *interface-name* is a physical interface, the output includes:

- Brief QoS information about the physical interface
- Brief QoS information about the logical interface
- CoS information about the physical interface
- Brief information about filters or policers of the logical interface
- Brief CoS information about the logical interface

If the **interface** *interface-name* is a logical interface, the output includes:

- Brief QoS information about the logical interface
- Information about filters or policers for the logical interface
- CoS information about the logical interface

interface-name—(Optional) Display class-of-service (CoS) associations for the specified interface.

Required Privilege Level view

List of Sample Output show class-of-service interface (Physical) on page 456

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show class-of-service interface (Logical) on page 457
show class-of-service interface (Gigabit Ethernet) on page 457
show class-of-service interface (PPPoE Interface) on page 457
show class-of-service interface (T4000 Routers with Type 5 FPCs) on page 457
show class-of-service interface detail on page 458
show class-of-service interface comprehensive on page 458
show class-of-service interface (ACX Series Routers) on page 469

Output Fields Table 40 on page 446 describes the output fields for the **show class-of-service interface** command. Output fields are listed in the approximate order in which they appear.

Table 40: show class-of-service interface Output Fields

Field Name	Field Description
Physical interface	Name of a physical interface.
Index	Index of this interface or the internal index of this object.
Dedicated Queues	Status of dedicated queues configured on an interface. Supported only on Trio MPC/MIC interfaces on MX Series routers.
Queues supported	Number of queues you can configure on the interface.
Queues in use	Number of queues currently configured.
Total non-default queues created	Number of queues created in addition to the default queues. Supported only on Trio MPC/MIC interfaces on MX Series routers.
Rewrite Input IEEE Code-point	(QFX Series only) IEEE 802.1p code point (priority) rewrite value. Incoming traffic from the Fibre Channel (FC) SAN is classified into the forwarding class specified in the native FC interface (NP_Port) fixed classifier and uses the priority specified as the IEEE 802.1p rewrite value.
Shaping rate	Maximum transmission rate on the physical interface. You can configure the shaping rate on the physical interface, or on the logical interface, but not on both. Therefore, the **Shaping rate** field is displayed for either the physical interface or the logical interface.
Scheduler map	Name of the output scheduler map associated with this interface.
Scheduler map forwarding class sets	(QFX Series only) Name of the fabric forwarding class set scheduler map associated with a QFabric system Interconnect device interface.
Input shaping rate	For Gigabit Ethernet IQ2 PICs, maximum transmission rate on the input interface.
Input scheduler map	For Gigabit Ethernet IQ2 PICs, name of the input scheduler map associated with this interface.
Chassis scheduler map	Name of the scheduler map associated with the packet forwarding component queues.
Rewrite	Name and type of the rewrite rules associated with this interface.
Classifier	Name and type of classifiers associated with this interface.

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Table 40: show class-of-service interface Output Fields *(continued)*

Field Name	Field Description
Forwarding-class-map	Name of the forwarding map associated with this interface.
Congestion-notification	(QFX Series only) Congestion notification state, **enabled** or **disabled**.
Logical interface	Name of a logical interface.
Object	Category of an object: **Classifier**, **Fragmentation-map** (for LSQ interfaces only), **Scheduler-map**, **Rewrite**, or **Translation Table** (for IQE PICs only).
Name	Name of an object.
Type	Type of an object: **dscp**, **dscp-ipv6**, **exp**, **ieee-802.1**, **ip**, or **inet-precedence**.
Link-level type	Encapsulation on the physical interface.
MTU	MTU size on the physical interface.
Speed	Speed at which the interface is running.
Loopback	Whether loopback is enabled and the type of loopback.
Source filtering	Whether source filtering is enabled or disabled.
Flow control	Whether flow control is enabled or disabled.
Auto-negotiation	(Gigabit Ethernet interfaces) Whether autonegotiation is enabled or disabled.
Remote-fault	(Gigabit Ethernet interfaces) Remote fault status. • **Online**—Autonegotiation is manually configured as online. • **Offline**—Autonegotiation is manually configured as offline.

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Table 40: show class-of-service interface Output Fields *(continued)*

Field Name	Field Description
Device flags	The **Device flags** field provides information about the physical device and displays one or more of the following values: • **Down**—Device has been administratively disabled. • **Hear-Own-Xmit**—Device receives its own transmissions. • **Link-Layer-Down**—The link-layer protocol has failed to connect with the remote endpoint. • **Loopback**—Device is in physical loopback. • **Loop-Detected**—The link layer has received frames that it sent, thereby detecting a physical loopback. • **No-Carrier**—On media that support carrier recognition, no carrier is currently detected. • **No-Multicast**—Device does not support multicast traffic. • **Present**—Device is physically present and recognized. • **Promiscuous**—Device is in promiscuous mode and recognizes frames addressed to all physical addresses on the media. • **Quench**—Transmission on the device is quenched because the output buffer is overflowing. • **Recv-All-Multicasts**—Device is in multicast promiscuous mode and therefore provides no multicast filtering. • **Running**—Device is active and enabled.

Interface flags	The **Interface flags** field provides information about the physical interface and displays one or more of the following values:
	• **Admin-Test**—Interface is in test mode and some sanity checking, such as loop detection, is disabled.
	• **Disabled**—Interface is administratively disabled.
	• **Down**—A hardware failure has occurred.
	• **Hardware-Down**—Interface is nonfunctional or incorrectly connected.
	• **Link-Layer-Down**—Interface keepalives have indicated that the link is incomplete.
	• **No-Multicast**—Interface does not support multicast traffic.
	• **No-receive No-transmit**—Passive monitor mode is configured on the interface.
	• **Point-To-Point**—Interface is point-to-point.
	• **Pop all MPLS labels from packets of depth**—MPLS labels are removed as packets arrive on an interface that has the **pop-all-labels** statement configured. The depth value can be one of the following:
	  ◦ **1**—Takes effect for incoming packets with one label only.
	  ◦ **2**—Takes effect for incoming packets with two labels only.
	  ◦ **[1 2]**—Takes effect for incoming packets with either one or two labels.
	• **Promiscuous**—Interface is in promiscuous mode and recognizes frames addressed to all physical addresses.
	• **Recv-All-Multicasts**—Interface is in multicast promiscuous mode and provides no multicast filtering.
	• **SNMP-Traps**—SNMP trap notifications are enabled.
	• **Up**—Interface is enabled and operational.

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Table 40: show class-of-service interface Output Fields *(continued)*

Field Name	Field Description
Flags	The **Logical interface flags** field provides information about the logical interface and displays one or more of the following values: • **ACFC Encapsulation**—Address control field Compression (ACFC) encapsulation is enabled (negotiated successfully with a peer). • **Device-down**—Device has been administratively disabled. • **Disabled**—Interface is administratively disabled. • **Down**—A hardware failure has occurred. • **Clear-DF-Bit**—GRE tunnel or IPsec tunnel is configured to clear the Don't Fragment (DF) bit. • **Hardware-Down**—Interface protocol initialization failed to complete successfully. • **PFC**—Protocol field compression is enabled for the PPP session. • **Point-To-Point**—Interface is point-to-point. • **SNMP-Traps**—SNMP trap notifications are enabled. • **Up**—Interface is enabled and operational.
Encapsulation	Encapsulation on the logical interface.
Admin	Administrative state of the interface (**Up** or **Down**)
Link	Status of physical link (**Up** or **Down**).
Proto	Protocol configured on the interface.
Input Filter	Names of any firewall filters to be evaluated when packets are received on the interface, including any filters attached through activation of dynamic service.
Output Filter	Names of any firewall filters to be evaluated when packets are transmitted on the interface, including any filters attached through activation of dynamic service.
Link flags	Provides information about the physical link and displays one or more of the following values: • **ACFC**—Address control field compression is configured. The Point-to-Point Protocol (PPP) session negotiates the ACFC option. • **Give-Up**—Link protocol does not continue connection attempts after repeated failures. • **Loose-LCP**—PPP does not use the Link Control Protocol (LCP) to indicate whether the link protocol is operational. • **Loose-LMI**—Frame Relay does not use the Local Management Interface (LMI) to indicate whether the link protocol is operational. • **Loose-NCP**—PPP does not use the Network Control Protocol (NCP) to indicate whether the device is operational. • **Keepalives**—Link protocol keepalives are enabled. • **No-Keepalives**—Link protocol keepalives are disabled. • **PFC**—Protocol field compression is configured. The PPP session negotiates the PFC option.
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.
CoS queues	Number of CoS queues configured.

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Table 40: show class-of-service interface Output Fields *(continued)*

Field Name	Field Description
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped: *year-month-day hour:minute:second:timezone* (*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago).**
Statistics last cleared	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.
IPv6 transit statistics	Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.
Input errors	Input errors on the interface. The labels are explained in the following list: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **Giants**—Number of frames received that are larger than the giant threshold. • **Bucket Drops**—Drops resulting from the traffic load exceeding the interface transmit or receive leaky bucket configuration. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. Layer 3 incomplete errors can be ignored by configuring the **ignore-l3-incompletes** statement. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **HS link FIFO overflows**—Number of FIFO overflows on the high-speed links between the ASICs responsible for handling the router interfaces.

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Table 40: show class-of-service interface Output Fields *(continued)*

Field Name	Field Description
Output errors	Output errors on the interface. The labels are explained in the following list: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. NOTE: Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), the **Drops** field does not always use the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **HS link FIFO underflows**—Number of FIFO underflows on the high-speed links between the ASICs responsible for handling the router interfaces. • **MTU errors**—Number of packets whose size exceeds the MTU of the interface.
Egress queues	Total number of egress queues supported on the specified interface.
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism. NOTE: Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), the **Dropped packets** field does not always display the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs.
SONET alarms **SONET defects**	(SONET) SONET media-specific alarms and defects that prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: **SONET PHY**, **SONET section**, **SONET line**, and **SONET path**.
SONET PHY	Counts of specific SONET errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. A state other than **OK** indicates a problem. The **SONET PHY** field has the following subfields: • **PLL Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal

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Table 40: show class-of-service interface Output Fields *(continued)*

Field Name	Field Description
SONET section	Counts of specific SONET errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. A state other than **OK** indicates a problem. The **SONET section** field has the following subfields: • **BIP-B1**—Bit interleaved parity for SONET section overhead • **SEF**—Severely errored framing • **LOS**—Loss of signal • **LOF**—Loss of frame • **ES-S**—Errored seconds (section) • **SES-S**—Severely errored seconds (section) • **SEFS-S**—Severely errored framing seconds (section)
SONET line	Active alarms and defects, plus counts of specific SONET errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. A state other than **OK** indicates a problem. The **SONET line** field has the following subfields: • **BIP-B2**—Bit interleaved parity for SONET line overhead • **REI-L**—Remote error indication (near-end line) • **RDI-L**—Remote defect indication (near-end line) • **AIS-L**—Alarm indication signal (near-end line) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **ES-L**—Errored seconds (near-end line) • **SES-L**—Severely errored seconds (near-end line) • **UAS-L**—Unavailable seconds (near-end line) • **ES-LFE**—Errored seconds (far-end line) • **SES-LFE**—Severely errored seconds (far-end line) • **UAS-LFE**—Unavailable seconds (far-end line)

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Table 40: show class-of-service interface Output Fields *(continued)*

Field Name	Field Description
SONET path	Active alarms and defects, plus counts of specific SONET errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. A state other than **OK** indicates a problem. The **SONET path** field has the following subfields: • **BIP-B3**—Bit interleaved parity for SONET section overhead • **REI-P**—Remote error indication • **LOP-P**—Loss of pointer (path) • **AIS-P**—Path alarm indication signal • **RDI-P**—Path remote defect indication • **UNEQ-P**—Path unequipped • **PLM-P**—Path payload (signal) label mismatch • **ES-P**—Errored seconds (near-end STS path) • **SES-P**—Severely errored seconds (near-end STS path) • **UAS-P**—Unavailable seconds (near-end STS path) • **ES-PFE**—Errored seconds (far-end STS path) • **SES-PFE**—Severely errored seconds (far-end STS path) • **UAS-PFE**—Unavailable seconds (far-end STS path)
Received SONET overhead **Transmitted SONET overhead**	Values of the received and transmitted SONET overhead: • **C2**—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • **F1**—Section user channel byte. This byte is set aside for the purposes of users. • **K1** and **K2**—These bytes are allocated for APS signaling for the protection of the multiplex section. • **J0**—Section trace. This byte is defined for STS-1 number 1 of an STS-*N* signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • **S1**—Synchronization status. The S1 byte is located in the first STS-1 number of an STS-*N* signal. • **Z3** and **Z4**—Allocated for future use.
Received path trace **Transmitted path trace**	SONET/SDH interfaces allow path trace bytes to be sent inband across the SONET/SDH link. Juniper Networks and other router manufacturers use these bytes to help diagnose misconfigurations and network errors by setting the transmitted path trace message so that it contains the system hostname and name of the physical interface. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits.
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware.

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Table 40: show class-of-service interface Output Fields *(continued)*

Field Name	Field Description
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.
Forwarding classes	Total number of forwarding classes supported on the specified interface.
Egress queues	Total number of egress queues supported on the specified interface.
Queue	Queue number.
Forwarding classes	Forwarding class name.
Queued Packets	Number of packets queued to this queue.
Queued Bytes	Number of bytes queued to this queue. The byte counts vary by PIC type.
Transmitted Packets	Number of packets transmitted by this queue. When fragmentation occurs on the egress interface, the first set of packet counters shows the postfragmentation values. The second set of packet counters (displayed under the **Packet Forwarding Engine Chassis Queues** field) shows the prefragmentation values.
Transmitted Bytes	Number of bytes transmitted by this queue. The byte counts vary by PIC type.
Tail-dropped packets	Number of packets dropped because of tail drop.

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Table 40: show class-of-service interface Output Fields *(continued)*

Field Name	Field Description

RED-dropped packets	Number of packets dropped because of random early detection (RED).
	• (M Series and T Series routers only) On M320 and M120 routers and the T Series routers, the total number of dropped packets is displayed. On all other M Series routers, the output classifies dropped packets into the following categories:
	  • **Low, non-TCP**—Number of low-loss priority non-TCP packets dropped because of RED.
	  • **Low, TCP**—Number of low-loss priority TCP packets dropped because of RED.
	  • **High, non-TCP**—Number of high-loss priority non-TCP packets dropped because of RED.
	  • **High, TCP**—Number of high-loss priority TCP packets dropped because of RED.
	• (MX Series routers with enhanced DPCs, and T Series routers with enhanced FPCs only) The output classifies dropped packets into the following categories:
	  • **Low**—Number of low-loss priority packets dropped because of RED.
	  • **Medium-low**—Number of medium-low loss priority packets dropped because of RED.
	  • **Medium-high**—Number of medium-high loss priority packets dropped because of RED.
	  • **High**—Number of high-loss priority packets dropped because of RED.
	NOTE: Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), this field does not always display the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs.

RED-dropped bytes	Number of bytes dropped because of RED. The byte counts vary by PIC type.
	• (M Series and T Series routers only) On M320 and M120 routers and the T Series routers, only the total number of dropped bytes is displayed. On all other M Series routers, the output classifies dropped bytes into the following categories:
	  • **Low, non-TCP**—Number of low-loss priority non-TCP bytes dropped because of RED.
	  • **Low, TCP**—Number of low-loss priority TCP bytes dropped because of RED.
	  • **High, non-TCP**—Number of high-loss priority non-TCP bytes dropped because of RED.
	  • **High, TCP**—Number of high-loss priority TCP bytes dropped because of RED.
	NOTE: Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), this field does not always display the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs.

Transmit rate	Configured transmit rate of the scheduler. The rate is a percentage of the total interface bandwidth.
Rate Limit	Rate limiting configuration of the queue. Possible values are : • **None**—No rate limit. • **exact**—Queue transmits at the configured rate.
Buffer size	Delay buffer size in the queue.
Priority	Scheduling priority configured as **low** or **high**.
Excess Priority	Priority of the excess bandwidth traffic on a scheduler: **low**, **medium-low**, **medium-high**, **high**, or **none**.

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Table 40: show class-of-service interface Output Fields *(continued)*

Field Name	Field Description
Drop profiles	Display the assignment of drop profiles. • **Loss priority**—Packet loss priority for drop profile assignment. • **Protocol**—Transport protocol for drop profile assignment. • **Index**—Index of the indicated object. Objects that have indexes in this output include schedulers and drop profiles. • **Name**—Name of the drop profile. • **Type**—Type of the drop profile: **discrete** or **interpolated**. • **Fill Level**—Percentage fullness of a queue. • **Drop probability**—Drop probability at this fill level.
Excess Priority	Priority of the excess bandwidth traffic on a scheduler.
Drop profiles	Display the assignment of drop profiles. • **Loss priority**—Packet loss priority for drop profile assignment. • **Protocol**—Transport protocol for drop profile assignment. • **Index**—Index of the indicated object. Objects that have indexes in this output include schedulers and drop profiles. • **Name**—Name of the drop profile. • **Type**—Type of the drop profile: **discrete** or **interpolated**. • **Fill Level**—Percentage fullness of a queue. • **Drop probability**—Drop probability at this fill level.
Adjustment information	Display the assignment of shaping-rate adjustments on a scheduler node or queue. • **Adjusting application**—Application that is performing the shaping-rate adjustment. ◦ The adjusting application can appear as **ancp LS-0**, which is the Junos OS Access Node Control Profile process (**ancpd**) that performs shaping-rate adjustments on schedule nodes. ◦ The adjusting application can also appear as **pppoe**, which adjusts the shaping-rate and overhead-accounting class-of-service attributes on dynamic subscriber interfaces in a broadband access network based on access line parameters in Point-to-Point Protocol over Ethernet (PPPoE) Tags [TR-101]. This feature is supported on MPC/MIC interfaces on MX Series routers. The shaping rate is based on the actual-data-rate-downstream attribute. The overhead accounting value is based on the access-loop-encapsulation attribute and specifies whether the access loop uses Ethernet (frame mode) or ATM (cell mode). • **Adjustment type**—Type of adjustment: **absolute** or **delta**. • **Configured shaping rate**—Shaping rate configured for the scheduler node or queue. • **Adjustment value**—Value of adjusted shaping rate. • **Adjustment target**—Level of shaping-rate adjustment performed: **node** or **queue**. • **Adjustment overhead-accounting mode**—Configured shaping mode: **frame** or **cell**.

Sample Output

show class-of-service interface (Physical)

```
user@host> show class-of-service interface so-0/2/3
Physical interface: so-0/2/3, Index: 135
Queues supported: 8, Queues in use: 4
```


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```
Total non-default queues created: 4
  Scheduler map: <default>, Index: 2032638653

  Logical interface: fe-0/0/1.0, Index: 68, Dedicated Queues: no
    Shaping rate: 32000
    Object                  Name                  Type           Index
    Scheduler-map           <default>                             27
    Rewrite                 exp-default           exp             21
    Classifier              exp-default           exp             5
    Classifier              ipprec-compatibility  ip              8
    Forwarding-class-map    exp-default           exp             5
```

show class-of-service interface (Logical)

```
user@host> show class-of-service interface so-0/2/3.0
Logical interface: so-0/2/3.0, Index: 68, Dedicated Queues: no
    Shaping rate: 32000
    Object                  Name                  Type             Index
    Scheduler-map           <default>                               27
    Rewrite                 exp-default           exp               21
    Classifier              exp-default           exp               5
    Classifier              ipprec-compatibility  ip                8
    Forwarding-class-map    exp-default           exp               5
```

show class-of-service interface (Gigabit Ethernet)

```
user@host> show class-of-service interface ge-6/2/0
Physical interface: ge-6/2/0, Index: 175
Queues supported: 4, Queues in use: 4
  Scheduler map: <default>, Index: 2
  Input scheduler map: <default>, Index: 3
  Chassis scheduler map: <default-chassis>, Index: 4
```

show class-of-service interface (PPPoE Interface)

```
user@host> show class-of-service interface pp0.1
Logical interface: pp0.1, Index: 85
    Object                  Name                  Type           Index
    Traffic-control-profile tcp-pppoe.o.pp0.1     Output         2726446535
    Classifier              ipprec-compatibility  ip             13

    Adjusting application: PPPoE
      Adjustment type: absolute
      Adjustment value: 5000000
      Adjustment overhead-accounting mode: cell
      Adjustment target: node
```

show class-of-service interface (T4000 Routers with Type 5 FPCs)

```
user@host> show class-of-service interface xe-4/0/0
Physical interface: xe-4/0/0, Index: 153
    Queues supported: 8, Queues in use: 4
      Shaping rate: 5000000000 bps
      Scheduler map: <default>, Index: 2
      Congestion-notification: Disabled

      Logical interface: xe-4/0/0.0, Index: 77
        Object                  Name                    Type
Index
        Classifier              ipprec-compatibility    ip
  13
```

show class-of-service interface detail

```
user@host> show class-of-service interface ge-0/3/0 detail

Physical interface: ge-0/3/0, Enabled, Physical link is Up
  Link-level type: Ethernet, MTU: 1518, Speed: 1000mbps, Loopback: Disabled,
Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000

  Physical interface: ge-0/3/0, Index: 138
  Queues supported: 4, Queues in use: 5
  Shaping rate: 50000 bps
  Scheduler map: interface-schedular-map, Index: 58414
  Input shaping rate: 10000 bps
878674  Input scheduler map: schedular-map, Index: 15103
  Chassis scheduler map: <default-chassis>, Index: 4
  Congestion-notification: Disabled

  Logical interface ge-0/3/0.0
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.1 ]  Encapsulation: ENET2
    inet
    mpls
Interface       Admin Link Proto Input Filter         Output Filter
ge-0/3/0.0      up    up   inet
                           mpls
Interface       Admin Link Proto Input Policer         Output Policer
ge-0/3/0.0      up    up   inet
                           mpls

  Logical interface: ge-0/3/0.0, Index: 68
    Object                 Name                   Type               Index
    Rewrite                exp-default            exp (mpls-any)       33
    Classifier             exp-default            exp                  10
    Classifier             ipprec-compatibility   ip                   13


  Logical interface ge-0/3/0.1
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.2 ]  Encapsulation: ENET2
    inet
Interface       Admin Link Proto Input Filter         Output Filter
ge-0/3/0.1      up    up   inet
Interface       Admin Link Proto Input Policer         Output Policer
ge-0/3/0.1      up    up   inet

  Logical interface: ge-0/3/0.1, Index: 69
    Object                 Name                   Type            Index
    Classifier             ipprec-compatibility   ip               13
```

show class-of-service interface comprehensive

```
user@host> show class-of-service interface ge-0/3/0 comprehensive
Physical interface: ge-0/3/0, Enabled, Physical link is Up
  Interface index: 138, SNMP ifIndex: 601, Generation: 141
  Link-level type: Ethernet, MTU: 1518, Speed: 1000mbps, BPDU Error: None,
MAC-REWRITE Error: None, Loopback: Disabled, Source filtering: Disabled, Flow
control: Enabled,
  Auto-negotiation: Enabled, Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
```


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```
  CoS queues     : 4 supported, 4 maximum usable queues
  Schedulers     : 256
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:14:f6:f4:b4:5d, Hardware address: 00:14:f6:f4:b4:5d
  Last flapped   : 2010-09-07 06:35:22 PDT (15:14:42 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
   IPv6 total statistics:
    Input  bytes  :                  0
    Output bytes  :                  0
    Input  packets:                  0
    Output packets:                  0
  Ingress traffic statistics at Packet Forwarding Engine:
   Input  bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Drop   bytes  :                   0                   0 bps
   Drop   packets:                   0                   0 pps
  Label-switched interface (LSI) traffic statistics:
   Input  bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0, L3
incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, FIFO errors: 0,
Resource errors: 0
  Output errors:
    Carrier transitions: 5, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
 FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
  Ingress queues: 4 supported, 5 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 af3                            0                   0                   0

    1 af2                            0                   0                   0

    2 ef2                            0                   0                   0

    3 ef1                            0                   0                   0

  Egress queues: 4 supported, 5 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 af3                            0                   0                   0

    1 af2                            0                   0                   0

    2 ef2                            0                   0                   0

    3 ef1                            0                   0                   0

  Active alarms  : None
  Active defects : None
  MAC statistics:                      Receive         Transmit
    Total octets                             0                0
    Total packets                            0                0
    Unicast packets                          0                0
    Broadcast packets                        0                0
    Multicast packets                        0                0
```

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```
    CRC/Align errors                          0                0
    FIFO errors                               0                0
    MAC control frames                        0                0
    MAC pause frames                          0                0
    Oversized frames                          0
    Jabber frames                             0
    Fragment frames                           0
    VLAN tagged frames                        0
    Code violations                           0
  Filter statistics:
    Input packet count                        0
    Input packet rejects                      0
    Input DA rejects                          0
    Input SA rejects                          0
    Output packet count                                        0
    Output packet pad count                                    0
    Output packet error count                                  0
    CAM destination filters: 0, CAM source filters: 0
  Autonegotiation information:
    Negotiation status: Complete
    Link partner:
       Link mode: Full-duplex, Flow control: Symmetric/Asymmetric, Remote fault:
 OK
    Local resolution:
      Flow control: Symmetric, Remote fault: Link OK
  Packet Forwarding Engine configuration:
    Destination slot: 0
  CoS information:
    Direction : Output
    CoS transmit queue               Bandwidth               Buffer Priority
Limit
                              %            bps     %           usec
    2 ef2                    39          19500     0            120     high
none
    Direction : Input
    CoS transmit queue               Bandwidth               Buffer Priority
Limit
                              %            bps     %           usec
    0 af3                    30           3000    45              0      low
none

Physical interface: ge-0/3/0, Enabled, Physical link is Up
  Interface index: 138, SNMP ifIndex: 601
Forwarding classes: 16 supported, 5 in use
Ingress queues: 4 supported, 5 in use
Queue: 0, Forwarding classes: af3
  Queued:
    Packets              :                      0                      0 pps
    Bytes                :                      0                      0 bps
  Transmitted:
    Packets              :                      0                       0 pps
    Bytes                :                      0                      0 bps
    Tail-dropped packets : Not Available
    RED-dropped packets  :                      0                      0 pps
    RED-dropped bytes    :                      0                      0 bps
Queue: 1, Forwarding classes: af2
  Queued:
    Packets              :                      0                      0 pps
    Bytes                :                      0                      0 bps
  Transmitted:
    Packets              :                      0                       0 pps
```


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```
    Bytes               :                    0                    0 bps
    Tail-dropped packets : Not Available
    RED-dropped packets  :                    0                    0 pps
    RED-dropped bytes    :                    0                    0 bps
Queue: 2, Forwarding classes: ef2
  Queued:
    Packets             :                    0                    0 pps
    Bytes               :                    0                    0 bps
  Transmitted:
    Packets             :                    0                    0 pps
    Bytes               :                    0                    0 bps
    Tail-dropped packets : Not Available
    RED-dropped packets  :                    0                    0 pps
    RED-dropped bytes    :                    0                    0 bps
Queue: 3, Forwarding classes: ef1
  Queued:
    Packets             :                    0                    0 pps
    Bytes               :                    0                    0 bps
  Transmitted:
    Packets             :                    0                    0 pps
    Bytes               :                    0                    0 bps
    Tail-dropped packets : Not Available
    RED-dropped packets  :                    0                    0 pps
    RED-dropped bytes    :                    0                    0 bps
Forwarding classes: 16 supported, 5 in use
Egress queues: 4 supported, 5 in use
Queue: 0, Forwarding classes: af3
  Queued:
    Packets             :                    0                    0 pps
    Bytes               :                    0                    0 bps
  Transmitted:
    Packets             :                    0                    0 pps
    Bytes               :                    0                    0 bps
    Tail-dropped packets : Not Available
    RL-dropped packets   :                    0                    0 pps
    RL-dropped bytes     :                    0                    0 bps
    RED-dropped packets  :                    0                    0 pps
    RED-dropped bytes    :                    0                    0 bps
Queue: 1, Forwarding classes: af2
  Queued:
    Packets             :                    0                    0 pps
    Bytes               :                    0                    0 bps
  Transmitted:
    Packets             :                    0                    0 pps
    Bytes               :                    0                    0 bps
    Tail-dropped packets : Not Available
    RL-dropped packets   :                    0                    0 pps
    RL-dropped bytes     :                    0                    0 bps
    RED-dropped packets  :                    0                    0 pps
    RED-dropped bytes    :                    0                    0 bps
Queue: 2, Forwarding classes: ef2
  Queued:
    Packets             :                    0                    0 pps
    Bytes               :                    0                    0 bps
  Transmitted:
    Packets             :                    0                    0 pps
    Bytes               :                    0                    0 bps
    Tail-dropped packets : Not Available
    RL-dropped packets   :                    0                    0 pps
    RL-dropped bytes     :                    0                    0 bps
    RED-dropped packets  :                    0                    0 pps
```

```
    RED-dropped bytes    :                    0                    0 bps
Queue: 3, Forwarding classes: ef1
  Queued:
    Packets              :                    0                    0 pps
    Bytes                :                    0                    0 bps
  Transmitted:
    Packets              :                    0                    0 pps
    Bytes                :                    0                    0 bps
    Tail-dropped packets : Not Available
    RL-dropped packets   :                    0                    0 pps
    RL-dropped bytes     :                    0                    0 bps
    RED-dropped packets  :                    0                    0 pps
    RED-dropped bytes    :                    0                    0 bps

Packet Forwarding Engine Chassis Queues:
Queues: 4 supported, 5 in use
Queue: 0, Forwarding classes: af3
  Queued:
    Packets              :                    0                    0 pps
    Bytes                :                    0                    0 bps
  Transmitted:
    Packets              :                    0                    0 pps
    Bytes                :                    0                    0 bps
    Tail-dropped packets :                    0                    0 pps
    RED-dropped packets  : Not Available
    RED-dropped bytes    : Not Available
Queue: 1, Forwarding classes: af2
  Queued:
    Packets              :                    0                    0 pps
    Bytes                :                    0                    0 bps
  Transmitted:
    Packets              :                    0                    0 pps
    Bytes                :                    0                    0 bps
    Tail-dropped packets :                    0                    0 pps
    RED-dropped packets  : Not Available
    RED-dropped bytes    : Not Available
Queue: 2, Forwarding classes: ef2
  Queued:
    Packets              :                    0                    0 pps
    Bytes                :                    0                    0 bps
  Transmitted:
    Packets              :                    0                    0 pps
    Bytes                :                    0                    0 bps
    Tail-dropped packets :                    0                    0 pps
    RED-dropped packets  : Not Available
    RED-dropped bytes    : Not Available
Queue: 3, Forwarding classes: ef1
  Queued:
    Packets              :               108546                    0 pps
    Bytes                :             12754752                  376 bps
  Transmitted:
    Packets              :               108546                    0 pps
    Bytes                :             12754752                  376 bps
    Tail-dropped packets :                    0                    0 pps
    RED-dropped packets  : Not Available
    RED-dropped bytes    : Not Available

Physical interface: ge-0/3/0, Index: 138
Queues supported: 4, Queues in use: 5
  Shaping rate: 50000 bps
```


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```
Scheduler map: interface-schedular-map, Index: 58414

  Scheduler: ef2, Forwarding class: ef2, Index: 39155
    Transmit rate: 39 percent, Rate Limit: none, Buffer size: 120 us, Buffer
Limit: none, Priority: high
    Excess Priority: unspecified
    Drop profiles:
      Loss priority   Protocol    Index    Name
      Low             any             1    < default-drop-profile>
      Medium low      any             1    < default-drop-profile>
      Medium high     any             1    < default-drop-profile>
      High            any             1    < default-drop-profile>
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
  Input shaping rate: 10000 bps
  Input scheduler map: schedular-map

Scheduler map: schedular-map, Index: 15103

  Scheduler: af3, Forwarding class: af3, Index: 35058
    Transmit rate: 30 percent, Rate Limit: none, Buffer size: 45 percent, Buffer
 Limit: none, Priority: low
    Excess Priority: unspecified
    Drop profiles:
      Loss priority   Protocol    Index    Name
      Low             any         40582    green
      Medium low      any             1    < default-drop-profile>
      Medium high     any             1    < default-drop-profile>
      High            any         18928    yellow
Drop profile: green, Type: discrete, Index: 40582
  Fill level    Drop probability
         50                   0
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: yellow, Type: discrete, Index: 18928
  Fill level    Drop probability
         50                   0
        100                 100
  Chassis scheduler map: < default-drop-profile>
Scheduler map: < default-drop-profile>, Index: 4

  Scheduler: < default-drop-profile>, Forwarding class: af3, Index: 25
    Transmit rate: 25 percent, Rate Limit: none, Buffer size: 25 percent, Buffer
 Limit: none, Priority: low
    Excess Priority: low
    Drop profiles:
```

```
      Loss priority   Protocol    Index    Name
      Low             any             1    < default-drop-profile>
      Medium low      any             1    < default-drop-profile>
      Medium high     any             1    < default-drop-profile>
      High            any             1    < default-drop-profile>
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100

  Scheduler: < default-drop-profile>, Forwarding class: af2, Index: 25
    Transmit rate: 25 percent, Rate Limit: none, Buffer size: 25 percent, Buffer
 Limit: none, Priority: low
    Excess Priority: low
    Drop profiles:
      Loss priority   Protocol    Index    Name
      Low             any             1    < default-drop-profile>
      Medium low      any             1    < default-drop-profile>
      Medium high     any             1    < default-drop-profile>
      High            any             1    < default-drop-profile>
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100

  Scheduler: < default-drop-profile>, Forwarding class: ef2, Index: 25
    Transmit rate: 25 percent, Rate Limit: none, Buffer size: 25 percent, Buffer
 Limit: none, Priority: low
    Excess Priority: low
    Drop profiles:
      Loss priority   Protocol    Index    Name
      Low             any             1    < default-drop-profile>
      Medium low      any             1    < default-drop-profile>
      Medium high     any             1    < default-drop-profile>
      High            any             1    < default-drop-profile>
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
```


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```
  Fill level    Drop probability
        100                 100

  Scheduler: < default-drop-profile>, Forwarding class: ef1, Index: 25
    Transmit rate: 25 percent, Rate Limit: none, Buffer size: 25 percent, Buffer
 Limit: none, Priority: low
    Excess Priority: low
    Drop profiles:
      Loss priority   Protocol    Index    Name
      Low             any             1    < default-drop-profile>
      Medium low      any             1    < default-drop-profile>
      Medium high     any             1    < default-drop-profile>
      High            any             1    < default-drop-profile>
Drop profile: , Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
  Fill level    Drop probability
        100                 100
  Congestion-notification: Disabled
Forwarding class                        ID      Queue  Restricted queue  Fabric
priority  Policing priority
  af3                                    0       0          0             low
            normal
  af2                                    1       1          1             low
            normal
  ef2                                    2       2          2             high
            normal
  ef1                                    3       3          3             high
            normal
  af1                                    4       4          0             low
            normal

  Logical interface ge-0/3/0.0 (Index 68) (SNMP ifIndex 152) (Generation 159)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.1 ]  Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                    0 bps
     Output bytes  :                   0                    0 bps
     Input  packets:                   0                    0 pps
     Output packets:                   0                    0 pps
    Protocol inet, MTU: 1500, Generation: 172, Route table: 0
      Flags: Sendbcast-pkt-to-re
      Input Filters: filter-in-ge-0/3/0.0-i,
      Policer: Input: p1-ge-0/3/0.0-inet-i
    Protocol mpls, MTU: 1488, Maximum labels: 3, Generation: 173, Route table: 0
```

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```
      Flags: Is-Primary
      Output Filters: exp-filter,,,,,

Logical interface ge-1/2/0.0 (Index 347) (SNMP ifIndex 638) (Generation 156)

Forwarding class ID  Queue  Restricted queue  Fabric priority  Policing priority
   SPU priority
best-effort      0   0      0                 low              normal
    low

Aggregate Forwarding-class statistics per forwarding-class
  Aggregate Forwarding-class statistics:
   Forwarding-class statistics:

Forwarding-class best-effort statistics:
    Input unicast bytes:      0
    Output unicast bytes:     0
    Input unicast packets:    0
    Output unicast packets:   0

    Input multicast bytes:    0
    Output multicast bytes:   0
    Input multicast packets:  0
    Output multicast packets: 0

Forwarding-class expedited-forwarding statistics:
    Input unicast bytes:      0
    Output unicast bytes:     0
    Input unicast packets:    0
    Output unicast packets:   0

    Input multicast bytes:    0
    Output multicast bytes:   0
    Input multicast packets:  0
    Output multicast packets: 0

IPv4 protocol forwarding-class statistics:
  Forwarding-class statistics:
  Forwarding-class best-effort statistics:

    Input unicast bytes:      0
    Output unicast bytes:     0
    Input unicast packets:    0
    Output unicast packets:   0

    Input multicast bytes:    0
    Output multicast bytes:   0
    Input multicast packets:  0
    Output multicast packets: 0

Forwarding-class expedited-forwarding statistics:
    Input unicast bytes:      0
    Output unicast bytes:     0
    Input unicast packets:    0
    Output unicast packets:   0

    Input multicast bytes:    0
    Output multicast bytes:   0
    Input multicast packets:  0
    Output multicast packets: 0
```


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```
    IPv6  protocol forwarding-class statistics:
    Forwarding-class statistics:
     Forwarding-class best-effort statistics:

    Input unicast bytes:      0
    Output unicast bytes:     0
    Input unicast packets:    0
    Output unicast packets:   0

    Input multicast bytes:    0
    Output multicast bytes:   0
    Input multicast packets:  0
    Output multicast packets: 0

Forwarding-class expedited-forwarding statistics:
    Input unicast bytes:      0
    Output unicast bytes:     0
    Input unicast packets:    0
    Output unicast packets:   0

    Input multicast bytes:    0
    Output multicast bytes:   0
    Input multicast packets:  0
    Output multicast packets: 0


 Logical interface ge-0/3/0.0 (Index 68) (SNMP ifIndex 152)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.1 ]  Encapsulation: ENET2
    Input packets : 0
    Output packets: 0

Interface       Admin Link Proto Input Filter         Output Filter
ge-0/3/0.0      up    up   inet  filter-in-ge-0/3/0.0-i
                          mpls                       exp-filter
Interface       Admin Link Proto Input Policer         Output Policer
ge-0/3/0.0      up    up
                          inet  p1-ge-0/3/0.0-inet-i
                          mpls

Filter: filter-in-ge-0/3/0.0-i
Counters:
Name                                                Bytes              Packets
count-filter-in-ge-0/3/0.0-i                            0                    0

Filter: exp-filter
Counters:
Name                                                Bytes              Packets
count-exp-seven-match                                   0                    0
count-exp-zero-match                                    0                    0
Policers:
Name                                               Packets
p1-ge-0/3/0.0-inet-i                                    0


  Logical interface: ge-0/3/0.0, Index: 68
    Object                 Name                   Type                    Index

    Rewrite                exp-default            exp (mpls-any)            33

Rewrite rule: exp-default, Code point type: exp, Index: 33
```

```
  Forwarding class                  Loss priority       Code point
  af3                               low                 000
  af3                               high                001
  af2                               low                 010
  af2                               high                011
  ef2                               low                 100
  ef2                               high                101
  ef1                               low                 110
  ef1                               high                111
    Object                 Name                  Type                      Index

    Classifier             exp-default           exp                         10

Classifier: exp-default, Code point type: exp, Index: 10
  Code point         Forwarding class                  Loss priority
  000                af3                               low
  001                af3                               high
  010                af2                               low
  011                af2                               high
  100                ef2                               low
  101                ef2                               high
  110                ef1                               low
  111                ef1                               high
    Object                 Name                  Type                      Index

    Classifier             ipprec-compatibility  ip                          13

Classifier: ipprec-compatibility, Code point type: inet-precedence, Index: 13
  Code point         Forwarding class                  Loss priority
  000                af3                               low
  001                af3                               high
  010                af3                               low
  011                af3                               high
  100                af3                               low
  101                af3                               high
  110                ef1                               low
  111                ef1                               high
Forwarding class                    ID      Queue  Restricted queue  Fabric
priority  Policing priority
  af3                               0       0          0             low
            normal
  af2                               1       1          1             low
            normal
  ef2                               2       2          2             high
            normal
  ef1                               3       3          3             high
            normal
  af1                               4       4          0             low
            normal

  Logical interface ge-0/3/0.1 (Index 69) (SNMP ifIndex 154) (Generation 160)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.2 ]  Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :                  0
     Output bytes  :                  0
     Input  packets:                  0
     Output packets:                  0
    Local statistics:
     Input  bytes  :                  0
     Output bytes  :                  0
     Input  packets:                  0
```


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```
     Output packets:                    0
    Transit statistics:
     Input  bytes  :                    0                    0 bps
     Output bytes  :                    0                    0 bps
     Input  packets:                    0                    0 pps
     Output packets:                    0                    0 pps
    Protocol inet, MTU: 1500, Generation: 174, Route table: 0
      Flags: Sendbcast-pkt-to-re

  Logical interface ge-0/3/0.1 (Index 69) (SNMP ifIndex 154)
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.2 ]  Encapsulation: ENET2
    Input packets : 0
    Output packets: 0


Interface       Admin Link Proto Input Filter         Output Filter
ge-0/3/0.1      up    up   mpls
Interface       Admin Link Proto Input Policer         Output Policer
ge-0/3/0.1      up    up
                           mpls

  Logical interface: ge-0/3/0.1, Index: 69
    Object                 Name                   Type                    Index

    Classifier             ipprec-compatibility   ip                        13

Classifier: ipprec-compatibility, Code point type: inet-precedence, Index: 13
  Code point         Forwarding class                    Loss priority
  000                af3                                 low
  001                af3                                 high
  010                af3                                 low
  011                af3                                 high
  100                af3                                 low
  101                af3                                 high
  110                ef1                                 low
  111                ef1                                 high
Forwarding class                      ID      Queue  Restricted queue  Fabric
priority  Policing priority
  af3                                  0       0          0             low
            normal
  af2                                  1       1          1             low
            normal
  ef2                                  2       2          2             high
            normal
  ef1                                  3       3          3             high
            normal
  af1                                  4       4          0             low
            normal
```

show class-of-service interface (ACX Series Routers)

```
user@host-g11# show class-of-service interface
Physical interface: at-0/0/0, Index: 130
Queues supported: 4, Queues in use: 4
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled

  Logical interface: at-0/0/0.0, Index: 69
```

```
  Logical interface: at-0/0/0.32767, Index: 70

Physical interface: at-0/0/1, Index: 133
Queues supported: 4, Queues in use: 4
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled

  Logical interface: at-0/0/1.0, Index: 71

  Logical interface: at-0/0/1.32767, Index: 72

Physical interface: ge-0/1/0, Index: 146
Queues supported: 8, Queues in use: 5
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled
Object                  Name                    Type                    Index
Rewrite                 dscp-default            dscp                       31
Classifier              d1                      dscp                    11331
Classifier              ci                      ieee8021p                 583

  Logical interface: ge-0/1/0.0, Index: 73
Object                  Name                    Type                    Index
Rewrite                 custom-exp              exp (mpls-any)          46413

  Logical interface: ge-0/1/0.1, Index: 74

  Logical interface: ge-0/1/0.32767, Index: 75

Physical interface: ge-0/1/1, Index: 147
Queues supported: 8, Queues in use: 5
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled
Object                  Name                    Type                    Index
Classifier              ipprec-compatibility    ip                         13

  Logical interface: ge-0/1/1.0, Index: 76

Physical interface: ge-0/1/2, Index: 148
Queues supported: 8, Queues in use: 5
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled
Object                  Name                    Type                    Index
Rewrite                 ri                      ieee8021p (outer)       35392
Classifier              ci                      ieee8021p                 583

Physical interface: ge-0/1/3, Index: 149
Queues supported: 8, Queues in use: 5
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled
Object                  Name                    Type                    Index
Classifier              ipprec-compatibility    ip                         13

  Logical interface: ge-0/1/3.0, Index: 77
Object                  Name                    Type                    Index
Rewrite                 custom-exp2             exp (mpls-any)          53581

Physical interface: ge-0/1/4, Index: 150
Queues supported: 8, Queues in use: 5
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled
Object                  Name                    Type                    Index
```


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```
Classifier              ipprec-compatibility   ip                        13

Physical interface: ge-0/1/5, Index: 151
Queues supported: 8, Queues in use: 5
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled
Object                  Name                   Type                      Index
Classifier              ipprec-compatibility   ip                        13

Physical interface: ge-0/1/6, Index: 152
Queues supported: 8, Queues in use: 5
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled
Object                  Name                   Type                      Index
Classifier              ipprec-compatibility   ip                        13

Physical interface: ge-0/1/7, Index: 153
Queues supported: 8, Queues in use: 5
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled
Object                  Name                   Type                      Index
Classifier              d1                     dscp                      11331

Physical interface: ge-0/2/0, Index: 154
Queues supported: 8, Queues in use: 5
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled
Object                  Name                   Type                      Index
Classifier              ipprec-compatibility   ip                        13

Physical interface: ge-0/2/1, Index: 155
Queues supported: 8, Queues in use: 5
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled
Object                  Name                   Type                      Index
Classifier              ipprec-compatibility   ip                        13

  Logical interface: ge-0/2/1.0, Index: 78

  Logical interface: ge-0/2/1.32767, Index: 79

Physical interface: xe-0/3/0, Index: 156
Queues supported: 8, Queues in use: 5
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled
Object                  Name                   Type                      Index
Classifier              ipprec-compatibility   ip                        13

  Logical interface: xe-0/3/0.0, Index: 80

Physical interface: xe-0/3/1, Index: 157
Queues supported: 8, Queues in use: 5
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled
Object                  Name                   Type                      Index
Classifier              ipprec-compatibility   ip                        13

  Logical interface: xe-0/3/1.0, Index: 81

[edit]
user@host-g11#
```

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show class-of-service forwarding-table

List of Syntax
Syntax on page 473
Syntax (TX Matrix and TX Matrix Plus Router) on page 473

Syntax
show class-of-service forwarding-table

Syntax (TX Matrix and TX Matrix Plus Router)
show class-of-service forwarding-table
<lcc *number*> | <sfc *number*>

Release Information
Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 11.1 for the QFX Series.

Description
Display the entire class-of-service (CoS) configuration as it exists in the forwarding table. Executing this command is equivalent to executing all **show class-of-service forwarding-table** commands in succession.

Options
lcc *number*—(TX Matrix and TX Matrix Plus router only) (Optional) On a TX Matrix router, display the forwarding table configuration for a specific T640 router (or line-card chassis) configured in a routing matrix. On a TX Matrix Plus router, display the forwarding table configuration for a specific router (or line-card chassis) configured in the routing matrix.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

sfc *number*—(TX Matrix Plus routers only) (Optional) Display the forwarding table configuration for the TX Matrix Plus router. Replace ***number*** with **0**.

Required Privilege Level
view

List of Sample Output
show class-of-service forwarding-table on page 474
show class-of-service forwarding-table lcc (TX Matrix Plus Router) on page 475

Output Fields
See the output field descriptions for **show class-of-service forwarding-table** commands:

- *show class-of-service forwarding-table classifier*
- *show class-of-service forwarding-table classifier mapping*
- *show class-of-service forwarding-table drop-profile*

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- *show class-of-service forwarding-table fabric scheduler-map*
- *show class-of-service forwarding-table loss-priority-map*
- *show class-of-service forwarding-table loss-priority-map mapping*
- *show class-of-service forwarding-table rewrite-rule*
- *show class-of-service forwarding-table rewrite-rule mapping*
- *show class-of-service forwarding-table scheduler-map*

Sample Output

show class-of-service forwarding-table

```
user@host> show class-of-service forwarding-table
Classifier table index: 9, # entries: 8, Table type: EXP
Entry #   Code point   Forwarding-class #   PLP
   0          000        0                 0
   1          001        0                 1
   2          010        1                 0
   3          011        1                 1
   4          100        2                 0
   5          101        2                 1
   6          110        3                 0
   7          111        3                 1

                        Table Index/
Interface      Index      Q num      Table type
sp-0/0/0.1001     66         11      IPv4 precedence
sp-0/0/0.2001     67         11      IPv4 precedence
sp-0/0/0.16383    68         11      IPv4 precedence
fe-0/0/0.0        69         11      IPv4 precedence

Interface: sp-0/0/0 (Index: 129, Map index: 2, Map type: FINAL,
 Num of queues: 2):
  Entry 0 (Scheduler index: 16, Forwarding-class #: 0):
    Tx rate: 0 Kb (95%), Buffer size: 95 percent
Priority low
    PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
  Entry 1 (Scheduler index: 18, Forwarding-class #: 3):
    Tx rate: 0 Kb (5%), Buffer size: 5 percent
Priority low
    PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1

Interface: fe-0/0/0 (Index: 137, Map index: 2, Map type: FINAL,
 Num of queues: 2):
  Entry 0 (Scheduler index: 16, Forwarding-class #: 0):
    Tx rate: 0 Kb (95%), Buffer size: 95 percent
Priority low
    PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
  Entry 1 (Scheduler index: 18, Forwarding-class #: 3):
    Tx rate: 0 Kb (5%), Buffer size: 5 percent
Priority low
    PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
Interface: fe-0/0/1 (Index: 138, Map index: 2, Map type: FINAL,
 Num of queues: 2):
  Entry 0 (Scheduler index: 16, Forwarding-class #: 0):
    Tx rate: 0 Kb (95%), Buffer size: 95 percent
Priority low
```


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```
    PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
  Entry 1 (Scheduler index: 18, Forwarding-class #: 3):
    Tx rate: 0 Kb (5%), Buffer size: 5 percent
Priority low
    PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1

...

RED drop profile index: 1, # entries: 1
                                Drop
Entry      Fullness(%)    Probability(%)
    0              100               100
```

show class-of-service forwarding-table lcc (TX Matrix Plus Router)

```
user@host> show class-of-service forwarding-table lcc 0
lcc0-re0:
--------------------------------------------------------------------------------

Classifier table index: 9, # entries: 64, Table type: IPv6 DSCP
Entry #   Code point   Forwarding-class #   PLP
   0        000000        0       0
   1        000001        0       0
   2        000010        0       0
   3        000011        0       0
   4        000100        0       0
   5        000101        0       0
   6        000110        0       0
   7        000111        0       0
   8        001000        0       0
   9        001001        0       0
  10        001010        0       0
  11        001011        0       0
  12        001100        0       0
  13        001101        0       0
  14        001110        0       0
  15        001111        0       0
  16        010000        0       0
  17        010001        0       0
  18        010010        0       0
  19        010011        0       0
  20        010100        0       0
  21        010101        0       0
  22        010110        0       0
  23        010111        0       0
  24        011000        0       0
  25        011001        0       0
  26        011010        0       0
  27        011011        0       0
  28        011100        0       0
  29        011101        0       0
  30        011110        0       0
  31        011111        0       0
  32        100000        0       0
  33        100001        0       0
  34        100010        0       0
  35        100011        0       0
  36        100100        0       0
  37        100101        0       0
  38        100110        0       0
  39        100111        0       0
```

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```
  40          101000          0          0
  41          101001          0          0
  42          101010          0          0
  43          101011          0          0
  44          101100          0          0
  45          101101          0          0
  46          101110          0          0
...
```


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show interfaces (Channelized DS3-to-DS0)

Syntax
show interfaces ds-*fpc/pic/port:t1channel:ds0channel*
<brief | detail | extensive>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information
Command introduced before Junos OS Release 7.4.

Description
(M Series and T Series routers only) Display status information about the specified channelized DS3-to-DS0 interface.

Options
ds-*fpc/pic/port:t1channel:ds0channel*—Display standard information about the specified channelized DS3-to-DS0 interface.

brief | detail | extensive—(Optional) Display the specified level of output interface.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level
view

List of Sample Output
show interfaces extensive (Channelized DS3-to-DS0) on page 485

Output Fields
Table 41 on page 477 lists the output fields for the **show interfaces** (all Channelized DS3 interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 41: Channelized DS3 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

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Table 41: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Mode	Whether C-bit parity mode or M13 mode is enabled.	All levels
Framing	Physical layer framing format used on the link. It can be **ESF** or **SF**. The default is **ESF**.	All levels
Parent	(Channelized IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets that a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 41: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	(PPP and HDLC) Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

LMI settings	(Frame Relay) Settings for Local Management Interface (LMI) can be either **ANSI LMI settings** or **ITU LMI settings**. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value***, *value*, *value*...*xx* seconds, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) LMI packet statistics: • **Input**—Number of packets coming in on the interface (*nn*) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)**. • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last seen *hh:mm:ss* ago)**.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none

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Table 41: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the**Success** state. (Most likely with RADIUS authentication). • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped: *year-month-day hour:minute:second timezone hh:mm:ss* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface. • **Input packets, Output packets**—Number of packets received and transmitted on the interface.	**detail extensive**

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Table 41: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Giants**—Number of frames received that are larger than the giant threshold. • **Runts**—Number of frames received that are smaller than the runt threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Counter increments when the software could not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • **HS link CRC errors**—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces.	**extensive**
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware.	**extensive**

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Table 41: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS1 alarms **DS1 defects**	Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none
T1 media	Counts of T1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 media-specific error types can be: • **SEF**—Severely errored framing • **BEE**—Bit error event • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **YELLOW**—Errors at the remote site receiver • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CS**—Carrier state • **LES**—Line error seconds • **ES**—Errored seconds • **SEFS**—Severely errored framing seconds (section) • **SES**—Severely errored seconds • **BES**—Bit error seconds • **UAS**—Unavailable seconds	**extensive**

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Table 41: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS3 media	Counts of T3 media-specific errors. For detailed definitions of the T3 (DS-3) error events (BPV, EXZ, LCV, PCV, and CCV) and performance parameters (LES, PES, PSES, CES, CSES, SEFS, and UAS), see RFC 2496. • **PLL Lock**—Phase-locked loop out of lock • **Reframing**—Frame alignment recovery time • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **IDLE**—Idle code detected • **YELLOW**—Remote defect indication • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CCV**—C-bit coding violation • **LES**—Line error seconds • **PES**—P-bit errored seconds • **PSES**—P-bit errored seconds (section) • **CES**—C-bit errored seconds • **CSES**—C-bit severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Byte encoding**—Byte encoding used: **Nx64K** or **Nx56K**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**	**extensive**
Interface transmit queues	Name of the transmit queues and their associated statistics for each DS1 channel on the Channelized DS3-to-DS1 PIC. • **B/W**—Queue bandwidth as a percentage of the total interface bandwidth. • **WRR**—Weighted round-robin (in percent). • **Packets**—Number of packets transmitted. • **Bytes**—Number of bytes transmitted. • **Drops**—Number of packets dropped. • **Errors**—Number of packet errors.	**extensive**

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Table 41: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS1 or DS3 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface; values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Bandwidth	Bandwidth configured on the interface.	All levels
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, **mpls**.	**detail extensive** none

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Table 41: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive** none
Redundant Link	(LSQ redundancy) Backup link for Link Services IQ redundancy.	**detail extensive** none

Sample Output

show interfaces extensive (Channelized DS3-to-DS0)

```
user@host> show interfaces ds-0/0/0:0:0 extensive
Physical interface: ds-0/0/0:0:0, Enabled, Physical link is Up
  Interface index: 174, SNMP ifIndex: 4298, Generation: 177
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps, FCS: 16,
  Mode: C/Bit parity, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 280 (last seen 00:00:09 ago)
    Output: 286 (last sent 00:00:00 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Not-configured
  Last flapped   : 2002-05-23 17:53:29 PDT (00:46:46 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                 6814                   16 bps
   Output bytes  :                28840                   72 bps
   Input  packets:                  568                    0 pps
   Output packets:                  893                    0 pps
  Input errors:
```

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```
  Errors: 0, Drops: 0, Framing errors: 39, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 2, L2 mismatch timeouts: 0,
  HS link CRC errors: 0
Output errors:
  Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
DS1   alarms   : None
DS3   alarms   : None
DS1   defects  : None
DS3   defects  : None
T1  media:            Seconds        Count  State
  SEF                       0            0  OK
  BEE                       5            1  OK
  AIS                       0            0  OK
  LOF                       0            0  OK
  LOS                       0            0  OK
  YELLOW                   17            1  OK
  BPV                       0            0
  EXZ                       0            0
  LCV                       5        27765
  PCV                       0            0
  CS                        0            0
  LES                       0
  ES                        0
  SES                       5
  SEFS                     10
  BES                       0
  UAS                       0
DS3 media:            Seconds        Count  State
  PLL Lock                  0            0  OK
  Reframing                 0            0  OK
  AIS                       0            0  OK
  LOF                       0            0  OK
  LOS                       0            0  OK
  IDLE                      0            0  OK
  YELLOW                    0            0  OK
  BPV                       1        65535
  EXZ                       1        65535
  LCV                       2       131070
  PCV                       1         1825
  CCV                       0            0
  LES                       1
  PES                       1
  PSES                      1
  CES                       0
  CSES                      0
  SEFS                      0
  UAS                       0
Interface transmit queues:
            B/W  WRR       Packets        Bytes        Drops       Errors
  Queue0     95   95             0            0            0            0
  Queue1      5    5           893        28840            0            0
HDLC configuration:
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : 1-10
  Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, Induced error rate: 10e-0
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
```


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```
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 2 (0x01)
  CoS information:    CoS transmit queue             Bandwidth           Buffer
Priority   Limit
                                %          bps   %         usec
    0 best-effort              95       608000  95            0      low    none
    3 network-control           5        32000   5            0      low    none
 Logical interface ds-0/0/0:0:0.0 (Index 5) (SNMP ifIndex 4299)
  (Generation 943)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 949, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 18.18.18.1, Local: 18.18.18.2, Broadcast: Unspecified,
        Generation: 1849
```

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show interfaces (Channelized DS3-to-DS1)

Syntax show interfaces t1-*fpc/pic/port*:*t1channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information about the specified channelized DS3-to-DS1 interface.

Options **t1-*fpc/pic/port*:*t1channel***—Display standard information about the specified channelized DS3-to-DS1 interface.

brief | detail | extensive | terse—(Optional) Display brief interface information.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output show interfaces extensive (channelized DS3-to-DS1) on page 488

Output Fields See the output field table for the show interfaces (Channelized DS3-to-DS0) command.

Sample Output

show interfaces extensive (channelized DS3-to-DS1)

```
user@host> show interfaces t1-0/0/0:0 extensive
Physical interface: t1-0/0/0:0, Enabled, Physical link is Up
  Interface index: 210, SNMP ifIndex: 14, Generation: 2977
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Mode: C/Bit parity, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 30 (last seen 00:00:05 ago)
    Output: 29 (last sent 00:00:00 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
```


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```
CHAP state: Not-configured
Last flapped   : 2002-05-23 17:30:12 PDT (17:29:43 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                  944                   16 bps
 Output bytes  :                 1162                   16 bps
 Input  packets:                   66                    0 pps
 Output packets:                   82                    0 pps
Input errors:
  Errors: 1, Drops: 0, Framing errors: 1, Policed discards: 8,
  L3 incompletes: 0, L2 channel errors: 1, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
DS1   alarms   : None
DS3   alarms   : None
DS1   defects  : None
DS3   defects  : None
T1  media:            Seconds        Count  State
  SEF                       0            0  OK
  BEE                      11            5  OK
  AIS                      28            1  OK
  LOF                      27            1  OK
  LOS                       0            0  OK
  YELLOW                   23            1  OK
  BPV                       0            0
  EXZ                       0            0
  LCV                      11        20574
  PCV                       0            0
  CS                        0            0
  LES                      28
  ES                       28
  SES                      39
  SEFS                     50
  BES                       0
  UAS                       0
DS3 media:            Seconds        Count  State
  PLL Lock                  0            0  OK
  Reframing                 0            0  OK
  AIS                       0            0  OK
  LOF                       1            1  OK
  LOS                       1            1  OK
  IDLE                      0            0  OK
  YELLOW                    0            0  OK
  BPV                       2       131070
  EXZ                       3        49910
  LCV                       5       180980
  PCV                       2          327
  CCV                      12       264558
  LES                       3
  PES                       3
  PSES                      2
  CES                      13
  CSES                     13
  SEFS                      1
  UAS                      35
Interface transmit queues:
            B/W  WRR       Packets        Bytes        Drops       Errors
  Queue0     95   95             0            0            0            0
  Queue1      5    5            82         1162            0            0
HDLC configuration:
```

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```
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : 1-10
  Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, Induced error rate: 10e-0
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 2 (0x00)  CoS information:
  CoS transmit queue             Bandwidth           Buffer Priority   Limit
                            %          bps   %         usec
  0 best-effort            95       608000  95            0      low    none
  3 network-control         5        32000   5            0      low    none
Logical interface t1-0/0/0:0.0 (Index 11) (SNMP ifIndex 23) (Generation 497)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Bandwidth: 0
  Protocol inet, MTU: 1500, Generation: 576, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 21.21.21.2, Local: 21.21.21.1, Broadcast: Unspecified,
      Generation: 977
```


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show interfaces (Channelized E1 IQ)

Syntax
show interfaces (ce1-*fpc/pic/port* | *type-fpc/pic/port*<:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information
Command introduced before Junos OS Release 7.4.

Description
(M Series and T Series routers only) Display status information about the specified channelized E1 IQ interface.

Options
type-fpc/pic/port*:<*channel*>**—Interface type with optional corresponding channel levels. For the physical channelized E1 IQ interface, ***type is **ce**. For the clear channel, ***type*** is **e1**. At the first level of channelization, ***type*** is **ds**.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level
view

List of Sample Output
show interfaces (Channelized E1 IQ) (Physical) on page 491
show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation) on page 492
show interfaces extensive (Channelized E1 IQ MLFR Encapsulation) on page 493
show interfaces detail (Clear Channel E1) on page 494

Output Fields
For information about output fields, see the output field table for the show interfaces (Channelized E1) command. Output fields are listed in the approximate order in which they appear.

Sample Output

show interfaces (Channelized E1 IQ) (Physical)

```
user@host> show interfaces ce1-1/2/3
Physical interface: ce1-1/2/3, Enabled, Physical link is Up
  Interface index: 18, SNMP ifIndex: 1128
  Link-level type: Frame-relay, Controller, MTU: 1504, Clocking: Internal,   Speed:
 E1, Loopback: None, FCS: 16, Framing: G704, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
```

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```
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                     : 43186
    Full enquiries sent                : 8515
    Enquiry responses received         : 43185
    Full enquiry responses received    : 8515
  DCE statistics:
    Enquiries received                 : 0
    Full enquiries received            : 0
    Enquiry responses sent             : 0
    Full enquiry responses sent        : 0
  Common statistics:
    Unknown messages received          : 0
    Asynchronous updates received      : 0
    Out-of-sequence packets received   : 0
    Keepalive responses timedout       : 0
  Nonmatching DCE-end DLCIs:
          2
  Last flapped   : 2002-10-04 17:52:51 PDT (00:32:57 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None
```

show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation)

```
user@host> show interfaces ds-0/3/4:1 extensive
Physical interface: ds-0/3/4:1, Enabled, Physical link is Up
  Interface index: 151, SNMP ifIndex: 63, Generation: 34
  Link-level type: Multilink-PPP, MTU: 1518, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16,
  Parent: ce1-0/3/4 Interface index 150
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  CHAP state: Closed
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : Never
  Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :              6070570                  224 bps
   Input  packets:                    0                    0 pps
   Output packets:               209330                    0 pps
  Input errors:
    Errors: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
     Resource errors: 0
  HDLC configuration:
    Giant threshold: 1528, Runt threshold: 2
    Timeslots      : 1
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
```


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```
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)

  Logical interface ds-0/3/4:1.0 (Index 74) (SNMP ifIndex 64) (Generation 13)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol mlppp, Multilink bundle: ls-0/1/0.0, MTU: 1514, Generation: 24,
    Route table: 0
```

show interfaces extensive (Channelized E1 IQ MLFR Encapsulation)

```
user@host> show interfaces ds-0/3/4:5 extensive
Physical interface: ds-0/3/4:5, Enabled, Physical link is Up
  Interface index: 155, SNMP ifIndex: 72, Generation: 38
  Link-level type: Multilink-FR, MTU: 1518, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16,
  Parent: ce1-0/3/4 Interface index 150
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : No-Keepalives DCE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n392dce 3, n393dce 4, t392dce 15 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  DTE statistics:
    Enquiries sent                      : 0
    Full enquiries sent                 : 0
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
    Keepalive responses timedout        : 0
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : 2005-12-21 09:59:01 PST (1w0d 03:44 ago)
  Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
  Input errors:
    Errors: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
     Resource errors: 0
  HDLC configuration:
    Giant threshold: 1528, Runt threshold: 2
    Timeslots      : 5
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
```

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```
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x01)

  Logical interface ds-0/3/4:5.0 (Index 78) (SNMP ifIndex 73) (Generation 17)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                   0 bps
     Output bytes  :                   0                   0 bps
     Input  packets:                   0                   0 pps
     Output packets:                   0                   0 pps
    Protocol mlfr, Multilink bundle: ls-0/1/0.1, MTU: 1514, Generation: 28, Route
 table: 0
    DLCI 10
      Flags: Active
      Total down time: 0 sec, Last down: Never
      Traffic statistics:
       Input  bytes  :                 0
       Output bytes  :                 0
       Input  packets:                 0
       Output packets:                 0
  DLCI statistics:
    Active DLCI  :1  Inactive DLCI  :0
```

show interfaces detail (Clear Channel E1)

```
user@host> show interfaces e1-1/2/6 detail
Physical interface: e1-1/2/6, Enabled, Physical link is Up
  Interface index: 89, SNMP ifIndex: 1278, Generation: 341
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1, Loopback:None,
...
  Logical interface e1-1/2/6.0 (Index 52) (SNMP ifIndex 1279) (Generation 169)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
...
```


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show interfaces (Channelized E1)

Syntax
show interfaces ds-*fpc/pic/port:ds0channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information
Command introduced before Junos OS Release 7.4.

Description
(M Series and T Series routers only) Display status information the specified channelized E1 interface.

Options
ds-*fpc/pic/port:ds0channel*—Display standard information about the specified channelized E1 interface.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level
view

List of Sample Output
show interfaces extensive (Channelized E1) on page 503

Output Fields
Table 42 on page 495 lists the output fields for the **show interfaces** (Channelized E1 and Channelized E1 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

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Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used on the link. It can be **G704**, **G704-NO-CRC4**, or **Unframed**. The default is **G704**.	All levels
Parent	(Channelized E1 IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **Interval *seconds***—Time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **Down-count *number***—Number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **Up-count *number***—Number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	(PPP and HDLC) Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  ◦ (**last seen 00:00:00 ago**)—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  ◦ (**last seen 00:00:00 ago**)—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

LMI settings	(Frame Relay) Settings for link management can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx*** seconds, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) Statistics about the link management. • **Input**—Number of packets coming in on the interface (*nn*) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)** • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh:mm:ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for**n392dte** or **n393dce** intervals. (See **LMI settings**).	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay, displayed only from the DTE) Number of DLCIs configured from the DCE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*****hour:minute:second*** **ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none
CoS Queues	Number of CoS queues configured.	**detail extensive** none
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output Rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**

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Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Traffic statistics	Number of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Giants**—Number of frames received that are larger than the giant threshold. • **Runts**—Number of frames received that are smaller than the runt threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), then either the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets larger than the MTU threshold. • **Resource errors**—Sum of transmit drops.	**extensive**
DS1 alarms **DS1 defects**	E1 media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see *Bellcore Telcordia GR-499-CORE*. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
E1 media	Active alarms and defects, plus counts of specific E1 errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than OK indicates a problem. The E1 media-specific error types can be: • **SEF**—Severely errored framing • **BEE**—Bit error • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **YELLOW**—Errors at the remote site receiver • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CS**—Carrier state • **FEBE**—Far-end block error • **LES**—Line error seconds • **ES**—Errored seconds • **BES**—Bursty errored seconds • **SES**—Severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Line encodingHDB3**—Line encoding used.	**extensive**
Interface transmit queues	Names of the transmit queues and their associated statistics for each DS0 channel on the Channelized E1 to DS0 PIC. • **B/W**—Queue bandwidth as a percentage of the total interface bandwidth. • **WRR**—Weighted round robin (in percent). • **Packets**—Number of packets transmitted. • **Bytes**—Number of bytes transmitted. • **Drops**—Number of packets dropped. • **Errors**—Number of packet errors.	**extensive**

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Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS*x* BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified

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Table 42: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Traffic statistics	Number and rate of bytes and packets received and transmitted on the logical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than one second) for this counter to stabilize.	**detail extensive**
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, **mpls**.	**detail extensive** none
Multilink bundle	(Multilink) Interface name for the multilink bundle, if configured.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces extensive (Channelized E1)

```
user@host> show interfaces ds-0/1/1:1 extensive
```

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```
Physical interface: ds-0/1/1:1, Enabled, Physical link is Down
  Interface index: 163, SNMP ifIndex: 37, Generation: 46
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : 2005-12-28 14:44:06 PST (00:00:30 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
     Resource errors: 0
  DS1   alarms   : LOF, LOS
  DS1   defects  : LOF, LOS
  E1  media:            Seconds        Count  State
    SEF                  982318            1  Defect Active
    BEE                       0            0  OK
    AIS                       0            0  OK
    LOF                  982318            1  Defect Active
    LOS                  982318            1  Defect Active
    YELLOW                    0            0  OK
    BPV                       1            1
    EXZ                       1            1
    LCV                       1            1
    PCV                       1            2
    CS                        0            0
    FEBE                      1            9
    LES                       1
    ES                   982318
    SES                  982318
    SEFS                 982318
    BES                       1
    UAS                       0
  Interface transmit queues:
              B/W  WRR       Packets        Bytes        Drops       Errors
    Queue0     95   95             0            0            0            0
    Queue1      5    5             0            0            0            0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 3
    Timeslots      : 31
    Line encoding: HDB3, Data inversion: Disabled, Idle cycle flag: flags,
    Start end flag: shared
  DS1 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^11 - 1, O.152 and O.153 (2047 type),
     Pseudorandom (8)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 2 (0x1b)
  CoS information:
    CoS transmit queue     Bandwidth        Buffer   Priority   Limit
```

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```
                     %         bps     %   usec
  0 best-effort     95     1945600    95      0          low    none
  3 network-control  5      102400     5      0          low    none
```

show interfaces (Channelized OC12 IQ and IQE)

Syntax show interfaces (*type-fpc/pic/port*<:*channel*><:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description Display status information about the specified channelized OC12 IQ and IQE interface.

Options ***type-fpc/pic/port*:*channel*:*channel*:*channel***—Interface type with optional corresponding channel levels.

For SONET mode, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized OC12 IQ or IQE interface, ***type*** is **coc12**. For the clear channel, ***type*** is **so** (for OC12).
- ***type-fpc/pic/port*:*channel***—At the first level of channelization, ***type*** can be **coc1**(channelized OC1), **ct3** (from **coc1)**, **so** (for OC3), or **t3.**
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ct1** (from **ct3**or **coc1)** or **t1** (from **ct3** or **coc1)**.
- ***type-fpc/pic/port*:*channel*:*channel*:*channel***—At the third level of channelization, ***type*** is **ds** (from **ct1**).

For SDH mode, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized OC12 IQ or IQE interface, ***type*** is **cstm4**. For the clear channel, ***type*** is **so** (for SONET/SDH (vc-4-4c)).
- ***type-fpc/pic/port*:*channel***—At the first level of channelization,***type*** can be **so** (from **cstm4)** or **cau4** (from **cstm4)**.
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ct3**or **t3** (from or **cau4)**.
- ***type-fpc/pic/port*:*channel*:*channel*:*channel***—At the third level of channelization, ***type*** is **ct1** or **t1** (from **ct3**).
- ***type-fpc/pic/port*:*channel*:*channel*:*channel***—At the fourth level of channelization, ***type*** is **ds** (from **ct1**).

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

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statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output
show interfaces extensive (CAU4 on Channelized OC-12 IQ) on page 507
show interfaces extensive (Channelized OC1 on Channelized OC12 IQ) on page 507
show interfaces extensive (Channelized OC12 IQ) (Physical) on page 507
show interfaces extensive (Channelized T1 from Channelized OC12 IQ) on page 508
show interfaces extensive (Channelized T3 on Channelized OC12 IQ) on page 508
show interfaces extensive (CSTM4 on Channelized OC-12 IQ) on page 508
show interfaces extensive (DS0 on Channelized OC12 IQ) on page 508
show interfaces extensive (SONET Interface on Channelized OC12 IQ) on page 508
show interfaces extensive (T1 on Channelized OC12 IQ) on page 509

Output Fields See the output field table for the show interfaces (Channelized OC3 IQ and IQE) command.

Sample Output

show interfaces extensive (CAU4 on Channelized OC-12 IQ)

```
user@host> show interfaces cau4-0/2/0:1 extensive
Physical interface: cau4-0/2/0:1, Enabled, Physical link is Up
   Interface index: 219, SNMP ifIndex: 139, Generation: 221
   Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC3,
   Loopback: None, Parent: cstm4-0/2/0 Interface index 216
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : None
...
```

show interfaces extensive (Channelized OC1 on Channelized OC12 IQ)

```
user@host> show interfaces extensive coc1-4/2/0:7
Physical interface: coc1-4/2/0:7, Enabled, Physical link is Up
  Interface index: 381, SNMP ifIndex: 2524, Generation: 728
  Link-level type: Controller, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: 51840kbps, Loopback: None,
  FCS: 16, Payload scrambler: Disabled, Parent: coc12-4/2/0 (Index 266)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (Channelized OC12 IQ) (Physical)

```
user@host> show interfaces extensive coc12-4/2/0
Physical interface: coc12-4/2/0, Enabled, Physical link is Up
  Interface index: 266, SNMP ifIndex: 1269, Generation: 601
  Link-level type: Controller, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: OC12, Loopback: None,
  FCS: 16, Payload scrambler: Disabled, Parent: None  Device flags   : Present
Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
...
```

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show interfaces extensive (Channelized T1 from Channelized OC12 IQ)

```
user@host> show interfaces extensive ct1-4/2/0:7:1
Physical interface: ct1-4/2/0:4:1, Enabled, Physical link is Up
  Interface index: 305, SNMP ifIndex: 2410, Generation: 640
  Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16,
  Framing: ESF, Parent: coc1-4/2/0:7 (Index 304)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (Channelized T3 on Channelized OC12 IQ)

```
user@host> show interfaces ct3-0/2/0:1 extensive
Physical interface: ct3-0/2/0:1:1, Enabled, Physical link is Up
   Interface index: 220, SNMP ifIndex: 140, Generation: 222
   Link-level type: Controller, Clocking: Internal, Speed: T3, Loopback: None,
   Mode: C/Bit parity, Parent: cau4-0/2/0:1 Interface index 219
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : None
...
```

show interfaces extensive (CSTM4 on Channelized OC-12 IQ)

```
user@host> show interfaces cstm4-0/2/0 extensive
 Physical interface: cstm4-0/2/0, Enabled, Physical link is Up
   Interface index: 216, SNMP ifIndex: 33, Generation: 218
   Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC12,
   Loopback: None, Parent: None   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : None
...
```

show interfaces extensive (DS0 on Channelized OC12 IQ)

```
user@host> show interfaces extensive ds-4/2/0:7:1:1
Physical interface: ds-4/2/0:4:1:1, Enabled, Physical link is Up
  Interface index: 306, SNMP ifIndex: 2411, Generation: 641
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16, Parent: ct1-4/2/0:7:1 (Index 305)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
...
```

show interfaces extensive (SONET Interface on Channelized OC12 IQ)

```
user@host> show interfaces so-0/2/0:1 extensive
Physical interface: so-0/2/0:1, Enabled, Physical link is Up
  Interface index: 750, SNMP ifIndex: 23, Generation: 11709
  Link-level type: Multilink-FR, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, FCS: 16,
  Payload scrambler: Enabled, Parent: coc12-0/2/0 Interface index 749
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE
...
```


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show interfaces extensive (T1 on Channelized OC12 IQ)

```
user@host> show interfaces t1-0/2/0:1:1:1 extensive
   Physical interface: t1-0/2/0:1:1:1, Enabled, Physical link is Up
   Interface index: 222, SNMP ifIndex: 143, Generation: 226
   Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
   Loopback: None, FCS: 16, Framing: ESF, Parent: ct3-0/2/0:1:1
   Interface index 221
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : Keepalives
...
```

show interfaces (Channelized OC12)

Syntax show interfaces t3-*fpc/pic/port*:*t3channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description Display status information about the specified channelized OC12 interface.

Options

t3-*fpc/pic/port*:*t3channel*—Display standard information about the specified channelized OC12 interface.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output show interfaces extensive (Channelized OC12) on page 510

Output Fields See the output field table for the show interfaces (Channelized OC3 IQ and IQE) command.

Sample Output

show interfaces extensive (Channelized OC12)

```
user@host> show interfaces t3-0/3/0:0 extensive
Physical interface: t3-0/3/0:0, Enabled, Physical link is Up
  Interface index: 32, SNMP ifIndex: 21, Generation: 2719
  Link-level type: Frame-Relay, PPP, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: T3, Loopback: None, SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
```


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```
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
  Hold-times     : Up 0 ms, Down 0 ms
  Last flapped   : 2002-05-23 16:59:03 PDT (18:23:58 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                1700                    0 bps
   Output bytes  :                1714                    0 bps
   Input  packets:                 123                    0 pps
   Output packets:                 124                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 1100817, Bucket drops: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
  DS3   alarms   : None
  SONET alarms   : None
  DS3   defects  : None
  SONET defects  : None
  DS3 media:            Seconds        Count  State
    AIS                       0            0  OK
    LOF                      18            1  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                      36       122399
    CCV                      72        91948
    LES                       0
    PES                      18
    PSES                     18
    CES                      18
    CSES                     18
    SEFS                     18
    UAS                       0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 4484, Runt threshold: 3
  DSU configuration:
    Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
    FEAC loopback: Inactive, Response: Disabled, Count: 0
  DS3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: Unknown (0), Induced error rate: 10e-0
Interface transmit queues:
              B/W  WRR       Packets        Bytes        Drops       Errors
    Queue0     95   95             0            0            0            0
    Queue1      5    5           529         6348            0            0
```

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```
SONET PHY:            Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                20            1  OK
SONET section:
  BIP-B1                    0            0
  SEF                      20            1  OK
  LOS                      20            1  OK
  LOF                      20            1  OK
  ES-S                     20
  SES-S                    20
  SEFS-S                   20
SONET line:
  BIP-B2                    0            0
  REI-L                     0            0
  RDI-L                     0            0  OK
  AIS-L                     0            0  OK
  BERR-SF                  18            1  OK
  BERR-SD                   2            1  OK
  ES-L                     20
  SES-L                    20
  UAS-L                    10
  ES-LFE                    0
  SES-LFE                   0
  UAS-LFE                   0
SONET path:
  BIP-B3                    0            0
  REI-P                     0            0
  LOP-P                    20            1  OK
  AIS-P                     0            0  OK
  RDI-P                     0            0  OK
  UNEQ-P                    0            0  OK
  PLM-P                    20            1  OK
  ES-P                     20
  SES-P                    20
  UAS-P                    10
  ES-PFE                    0
  SES-PFE                   0
  UAS-PFE                   0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00, V5      : 0x00
  V5(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00, V5      : 0x00
Received path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 0d 0a   t3-0/3/0:0......
Transmitted path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 00 00   t3-0/3/0:0......
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue              Bandwidth           Buffer Priority   Limit
                             %          bps   %         usec
  0 best-effort             95     42499200  95            0      low    none
  3 network-control          5      2236800   5            0      low    none
Logical interface t3-0/3/0:0.0 (Index 11) (SNMP ifIndex 268) (Generation 499)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 4470, Generation: 578, Route table: 0
```


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```
     Flags: None
     Addresses, Flags: Is-Preferred Is-Primary
       Destination: 22.22.22.1, Local: 22.22.22.2, Broadcast: Unspecified,
Generation: 98
DLCI 100
     Flags: Active, Dce-configured
     Total down time: 0 sec, Last down: Never
     Traffic statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
 DLCI statistics:
   Active DLCI  :2 Inactive DLCI  : 0
```

show interfaces (Channelized OC3 IQ and IQE)

Syntax

show interfaces (*type-fpc/pic/port* <:*channel*><:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

(M Series and T Series routers only) Display status information about the specified channelized OC3 IQ or IQE interface.

Options

type-fpc/pic/port*:*channel*:*channel*:*channel—Interface type with optional corresponding channel levels. The interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical interface, ***type*** is **coc3**. For the clear channel, ***type*** is **so** (for OC3).
- ***type-fpc/pic/port*:*channel***—At the first level of channelization, ***type*** can be **coc1** (channelized OC1), **ct3** (from **coc1**), or **t3** (from **coc1**).
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ct1** (from **coc1** or **ct3**) or **t1** (from **coc1** or **ct3**).
- ***type-fpc/pic/port*:*channel*:*channel*:*channel***—At the third level of channelization, ***type*** can be **ds** (from **ct1**).

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces extensive (Channelized OC3 IQ) (Physical) on page 528
show interfaces extensive (Channelized OC1 on Channelized OC3 IQ) on page 529
show interfaces extensive (Channelized T1 on Channelized OC3 IQ) on page 530
show interfaces extensive (DS0 on Channelized OC3 IQ) on page 531

Output Fields

Table 43 on page 515 lists the output fields for the **show interfaces** (all Channelized OC interfaces) command. Output fields are listed in the approximate order in which they appear.

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Table 43: Channelized OC show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Description	Interface description.	All levels
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	SONET/SDH reference clock source. It can be **Internal** or **External**. Clocking is configured and displayed only for channel 0.	All levels
***Framing* mode**	Framing mode: **SONET** or **SDH**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
SONET loopback	Whether loopback is enabled on a SONET/SDH interface, and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16-bit**.	All levels
Payload scrambler	Whether payload scrambling is enabled.	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**

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Table 43: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
ANSI or ITU LMI settings	(Frame Relay) Settings for Local Management Interface (LMI). The format is **(ANSI or ITU) LMI settings: *value*, *value*... *nn*** seconds, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	All levels
LMI statistics	(Frame Relay) Statistics about the link management. • **Input**—Number of packets coming in on the interface (*nn*) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last sent *hh*:*mm*:*ss* ago)**. • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh*:*mm*:*ss* ago)**.	**detail extensive**
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none

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Table 43: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hh:mm:ss timezone year-month-day (hh:mm:ss*** **ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none
CoS Queues	Number of CoS queues configured.	**detail extensive** none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
DS1 alarms **DS1 defects**	E1or T1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. See the following list for all possible alarms and defects. For complete explanations of most of these alarms and defects, see *Bellcore Telcordia GR-499-CORE*. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 43: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
T1 media	Counts of T1 or E1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 or E1 media-specific error types are: • **SEF**—Severely errored framing • **BEE**—Bit error • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **YELLOW**—Errors at the remote site receiver • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CS**—Carrier state • **FEBE**—Far-end block error (E1 only) • **LES**—Line error seconds • **ES**—Errored seconds • **BES**—Bit error seconds • **SES**—Severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**

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Table 43: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **Giants**—Number of frames received that are larger than the giant threshold. • **Bucket Drops**—Drops caused by traffic load exceeding the interface transmit/receive leaky bucket configuration. The default is off. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value of this field increments, the PIC is malfunctioning. • **HS link FIFO overflows**—Number of FIFO overflows on the high-speed links between the ASICs responsible for handling the router interfaces. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 43: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions** —Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **HS link FIFO underflows**—Number of FIFO underflows on the high-speed links between the ASICs responsible for handling the router interfaces. • **MTU errors**—Number of packets whose size exceeds the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Egress queues	Total number of egress queues supported on the specified interface.	**detail extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
Active alarms **Active defects**	Defects that can prevent the interface from passing packets: • **None**—There are no active defects or alarms. • **LOF**—Loss of frame.	**detail extensive**
SONET alarms **SONET defects**	Media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: **SONET PHY**, **SONET section**, **SONET line**, and **SONET path**.	All levels

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Table 43: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SONET vt	SONET virtual-tributary (VT) alarms and defects: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B2**—Bit interleaved parity for SONET line overhead • **REI-V**—Remote error indication (near-end VT) • **LOP-V**—Loss of pointer (near-end VT) • **AIS-V**—Alarm indication signal (near-end VT) • **RDI-V**—Remote defect indication (near-end VT) • **UNEQ-V**—Unequipped (near-end VT) • **PLM-V**—Payload label mismatch (near-end VT) • **ES-V**—Errored seconds (near-end VT) • **SES-V**—Severely errored seconds (near-end VT) • **UAS-V**—Unavailable seconds (near-end VT) • **ES-VFE**—Errored seconds (far-end VT) • **SES-VFE**—Severely errored seconds (far-end VT) • **UAS-VFE**—Unavailable seconds (far-end VT)	**extensive**
SONET PHY	Counts of specific SONET errors with detailed information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **PLL Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**
SONET section	Counts of specific SONET errors with detailed information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B1**—Bit interleaved parity for SONET section overhead • **SEF**—Severely errored framing • **LOS**—Loss of signal • **LOL**—Loss of light • **LOF**—Loss of frame • **ES-S**—Errored seconds (section) • **SES-S**—Severely errored seconds (section) • **SEFS-S**—Severely errored framing seconds (section)	**extensive**

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Table 43: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SONET line	Active alarms and defects, plus counts of specific SONET errors with detailed information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State** —State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B2**—Bit interleaved parity for SONET line overhead • **REI-L**—Remote error indication (near-end line) • **RDI-L**—Remote defect indication (near-end line) • **AIS-L**—Alarm indication signal (near-end line) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **ES-L**—Errored seconds (near-end line) • **SES-L**—Severely errored seconds (near-end line) • **UAS-L**—Unavailable seconds (near-end line) • **ES-LFE**—Errored seconds (far-end line) • **SES-LFE**—Severely errored seconds (far-end line) • **UAS-LFE**—Unavailable seconds (far-end line)	**extensive**
SONET path	Active alarms and defects, plus counts of specific SONET errors with detailed information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B3**—Bit interleaved parity for SONET section overhead • **REI-P**—Remote error indication • **LOP-P**—Loss of pointer (path) • **AIS-P**—Path alarm indication signal • **RDI-P**—Path remote defect indication • **UNEQ-P**—Path unequipped • **PLM-P**—Path payload (signal) label mismatch • **ES-P**—Errored seconds (near-end STS path) • **SES-P**—Severely errored seconds (near-end STS path) • **UAS-P**—Unavailable seconds (near-end STS path) • **ES-PFE**—Errored seconds (far-end STS path) • **SES-PFE**—Severely errored seconds (far-end STS path) • **UAS-PFE**—Unavailable seconds (far-end STS path)	**extensive**

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Table 43: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Received SONET overhead **Transmitted SONET overhead**	Values of the received and transmitted SONET/SDH overhead: **F1**—Section user channel byte. This byte is set aside for the purposes of users. **S1**—Synchronization Status (S1). The S1 byte is located in the first STS-1 of an STS-*N*. Bits 5 through 8 convey the synchronization status of the network element. **Z3** and **Z4**—Path overhead. **V5**—Virtual Tributary (VT) path overhead byte.	**extensive**
SDH alarms **SDH defects**	SDH media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SDH PHY, SDH regenerator section, SDH multiplex section, and SDH path. NOTE: For controller based SONET PICs, the SDH alarms and SDH defects output in the **show interface coc3 extensive** command output only shows the section and line level defects. The path level defects can be found under the SONET (so) interface output.	All levels
SDH PHY	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **PLL Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**
SDH regenerator section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **RS-BIP8**—24-bit BIP for multiplex section overhead (B2 bytes) • **OOF**—Out of frame • **LOS**—Loss of signal • **LOF**—Loss of frame • **RS-ES**—Errored seconds (near-end regenerator section) • **RS-SES**—Severely errored seconds (near-end regenerator section) • **RS-SEFS**—Severely errored framing seconds (regenerator section)	**extensive**

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Table 43: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SDH multiplex section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **MS-BIP24**—8-bit BIP for high-order path overhead (B3 byte) • **MS-FEBE**—Far-end block error (multiplex section) • **MS-FERF**—Far-end remote fail (multiplex section) • **MS-AIS**—alarm indication signal (multiplex section) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **MS-ES**—Errored seconds (near-end multiplex section) • **MS-SES**—Severely errored seconds (near-end multiplex section) • **MS-UAS**—Unavailable seconds (near-end multiplex section) • **MS-ES-FE**—Errored seconds (far-end multiplex section) • **MS-SES-FE**—Severely errored seconds (far-end multiplex section) • **MS-UAS-FE**—Unavailable seconds (far-end multiplex section	**extensive**
SDH path	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **HP-BIP8**—8-bit BIP for regenerator section overhead (B1 byte) • **HP-FEBE**—Far-end block error (high-order path) • **HP-LOP**—Loss of pointer (high-order path) • **HP-AIS**—High-order-path alarm indication signal • **HP-FERF**—Far-end remote fail (high-order path) • **HP-UNEQ**—Unequipped (high-order path) • **HP-PLM**—Payload label mismatch (high-order path) • **HP-ES**—Errored seconds (near-end high-order path) • **HP-SES**—Severely errored seconds (near-end high-order path) • **HP-UAS**—Unavailable seconds (near-end high-order path) • **HP-ES-FE**—Errored seconds (far-end high-order path) • **HP-SES-FE**—Severely errored seconds (far-end high-order path) • **HP-UAS-FE**—Unavailable seconds (far-end high-order path)	**extensive**

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Table 43: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Received SDH overhead **Transmitted SDH overhead**	Values of the received and transmitted SONET overhead: • **C2**—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • **F1**—Section user channel byte. This byte is set aside for the purposes of users. • **K1** and **K2**—These bytes are allocated for APS signaling for the protection of the multiplex section. • **J0**—Section trace. This byte is defined for STS-1 number 1of an STS-*N* signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • **S1**—Synchronization status. The S1 byte is located in the first STS-1 of an STS-*N*. • **Z3** and **Z4**—Allocated for future use.	**extensive**
Received path trace **Transmitted path trace**	Channelized OC12 interfaces allow path trace bytes to be sent inband across the SONET/SDH link. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits. This information is specific to each of the 12 channelized OC12 interfaces.	**extensive**
DS3 media	Counts of T3 media-specific errors. For detailed definitions of the T3 (DS-3) error events (BPV, EXZ, LCV, PCV, and CCV) and performance parameters (LES, PES, PSES, CES, CSES, SEFS, and UAS), see RFC 2496. The DS3 or E3 media-specific error types can be: • **PLL Lock**—Phase-locked loop out of lock • **Reframing**—Frame alignment recovery time • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **IDLE**—Idle code detected • **YELLOW**—Errors at the remote site receiver • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—(DS3 only) Pulse code violation • **CCV**—(DS3 only) C-bit coding violation • **FEBE**—(DS3 only) Far-end block error • **LES**—Line error seconds • **PES**—(DS3 only) P-bit errored seconds • **PSES**—(DS3 only) P-bit errored seconds (section) • **CES**—(DS3 only) C-bit errored seconds • **CSES**—(DS3 only) C-bit severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**

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Table 43: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Line encoding**—Line encoding used. It is always **HDB3**. • **Byte encoding**—(T1 only) Byte encoding used: **Nx64K** or **Nx56K**. • **Line encoding**—Line encoding used. For T1, the value can be **B8ZS** or **AMI**. For E1, the value is **HDB3**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**. • **Idle cycle flag**—Idle cycle flags. • **Start end flag**—Start and end flag.	**extensive**
Interface transmit queues	Name of the transmit queues and their associated statistics for each DS3 channel on the Channelized OC12 PIC. • **B/W**—Queue bandwidth as a percentage of the total interface bandwidth. • **WRR**—Weighted round-robin (in percent). • **Packets**—Number of packets transmitted. • **Bytes**—Number of bytes transmitted. • **Drops**—Number of packets dropped. • **Errors**—Number of packet errors.	**extensive**
DSU configuration	Information about the DSU configuration. The last three lines (**Bit count**, **Error bit count**, and **LOS information**) are displayed only if a BERT has ever been run on the interface. • **Compatibility mode**—CSU/DSU compatibility mode: **None**, **Larscom**, **Kentrox**, or **Digital-Link**. • **Scrambling**—Payload scrambling. It can be **Enabled** or **Disabled**. • **Subrate**—Configured subrate setting. Applies only when**Digital-Link** compatibility mode is used. It can be **Disabled** or display units in kbps. • **FEAC loopback**—(T3) Whether a far-end alarm and control (FEAC) loopback is **Active** or **Inactive**. This feature is used to send alarm or status information from the far-end terminal back to the near-end terminal and to initiate T3 loopbacks at the far-end terminal from the near-end terminal. • **Response**—Whether the FEAC signal is **Enabled** or **Disabled**. • **Count**—Number of FEAC loopbacks.	**extensive**
BERT configuration	(DS interfaces) BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none

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Table 43: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Traffic statistics	Total number of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize. • **Input rate**—Rate of bits and packets received on the interface. • **Output rate**—Rate of bits and packets transmitted on the interface.	**detail extensive**
Local statistics	Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**

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Table 43: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Transit statistics	Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, or **mpls**.	**detail extensive** none
Multilink bundle	(If the logical interface is configured as part of a multilink bundle.) Interface name for the multilink bundle.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces extensive (Channelized OC3 IQ) (Physical)

```
user@host> show interfaces extensive coc3-0/0/0
Physical interface: coc3-0/0/0, Enabled, Physical link is Down
  Interface index: 128, SNMP ifIndex: 22, Generation: 11
  Description: pink coc3-0/0/0
```


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```
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: OC3,
  Loopback: None, Parent: None
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2005-01-27 16:39:21 PST (1w0d 22:09 ago)
  Statistics last cleared: Never
  SONET alarms   : PLL, LOS
  SONET defects  : PLL, LOF, LOS, SEF, AIS-L
  SONET PHY:            Seconds        Count  State
    PLL Lock             681767            1  PLL Lock Error
    PHY Light                 0            0  OK
  SONET section:
    BIP-B1                    0            0
    SEF                  681767            1  Defect Active
    LOS                  681767            1  Defect Active
    LOF                  681767            1  Defect Active
    ES-S                 681767
    SES-S                681767
    SEFS-S               681767
  SONET line:
    BIP-B2                    0            0
    REI-L                     0            0
    RDI-L                     0            0  OK
    AIS-L                681767            1  Defect Active
    BERR-SF                   0            0  OK
    BERR-SD                   0            0  OK
    ES-L                 681767
    SES-L                681767
    UAS-L                681757
    ES-LFE                    0
    SES-LFE                   0
    UAS-LFE                   0
  Received SONET overhead:
    F1      : 0x00, J0      : 0x00, K1      : 0xff, K2      : 0xff
    S1      : 0xff
  Transmitted SONET overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00
```

show interfaces extensive (Channelized OC1 on Channelized OC3 IQ)

```
user@host> show interfaces extensive coc1-0/0/0:1
Physical interface: coc1-0/0/0:1, Enabled, Physical link is Down
  Interface index: 133, SNMP ifIndex: 27, Generation: 16
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: 51840kbps,

   Loopback: None, Parent: coc3-0/0/0
 Interface index 128
  Device flags   : Present Running Down 16384
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2005-02-04 14:51:07 PST (00:00:35 ago)
  Statistics last cleared: Never
  SONET alarms   : None
  SONET defects  : AIS-P
  SONET path:
```

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```
    BIP-B3                    0            0
    REI-P                     0            0
    LOP-P                     0            0  OK
    AIS-P                    36            1  Defect Active
    RDI-P                     0            0  OK
    UNEQ-P                    0            0  OK
    PLM-P                     0            0  OK
    ES-P                     36
    SES-P                    36
    UAS-P                    26
    ES-PFE                    0
    SES-PFE                   0
    UAS-PFE                   0
  Received SONET overhead:
    C2      : 0xff, C2(cmp) : 0x01, F2      : 0x00, Z3      : 0x00
    Z4      : 0x00, S1(cmp) : 0x00
  Transmitted SONET overhead:
    C2      : 0x01, F2      : 0x00, Z3      : 0x00, Z4      : 0x00
  Received path trace:
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
  Transmitted path trace: router-1 coc1-0/0/0:1
    6b 61 76 65 72 69 20 63 6f 63 31 2d 30 2f 30 2f   router-1 coc1-0/0/0:1
    30 3a 31 00 00 00 00 00 00 00 00 00 00 00 00 00   ..............
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
```

show interfaces extensive (Channelized T1 on Channelized OC3 IQ)

```
user@host> show interfaces extensive ct1-0/0/0:1:1
Physical interface: ct1-0/0/0:1:1, Enabled, Physical link is Down
  Interface index: 134, SNMP ifIndex: 62, Generation: 17
  Link-level type: Controller, Clocking: Internal, Speed: T1, Loopback: None,
  Framing: ESF, Parent: coc1-0/0/0:1 Interface index 133
  Device flags   : Present Running Down 16384
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2005-02-04 14:54:35 PST (00:00:18 ago)
  Statistics last cleared: Never
  DS1   alarms   : None
  DS1   defects  : AIS, LOF
  T1  media:            Seconds        Count  State
    SEF                       1            1  OK
    BEE                       1            1  OK
    AIS                      18            1  Defect Active
    LOF                      18            1  Defect Active
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CS                        0            0
    LES                      18
    ES                       18
```


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```
    SES                     18
    SEFS                    18
    BES                      0
    UAS                     14
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  SONET alarms    : None
  SONET defects   : None
  SONET vt:
    BIP-BIP2                 0           0
    REI-V                    0           0
    LOP-V                    0           0  OK
    AIS-V                   19           1  Defect Active
    RDI-V                   19           1  Defect Active
    UNEQ-V                   0           0  OK
    PLM-V                   19           1  Defect Active
    ES-V                    19
    SES-V                   19
    UAS-V                    9
    ES-VFE                   0
    SES-VFE                  0
    UAS-VFE                  0
  Received SONET overhead:
    V5      : 0x07, V5(cmp) : 0x02
  Transmitted SONET overhead:
    V5      : 0x02
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
```

show interfaces extensive (DS0 on Channelized OC3 IQ)

```
user@host> show interfaces extensive ds-0/0/0:1:1:1
Physical interface: ds-0/0/0:1:1:1, Enabled, Physical link is Down
  Interface index: 135, SNMP ifIndex: 63, Generation: 18
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 320kbps,
  Loopback: None, FCS: 16, Parent: ct1-0/0/0:1:1  Interface index 134
  Device flags   : Present Running
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : Never
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                    0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
     Resource errors: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0
```

```
  2 assured-forw                 0                    0                    0

  3 network-cont                 0                    0                    0

HDLC configuration:
  Giant threshold: 1514, Runt threshold: 2
  Timeslots      : 1-5
  Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
  Start end flag: shared
DS0 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)
```


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show interfaces (Channelized STM1 IQ)

Syntax show interfaces (*type-fpc/pic /port* <:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information about the specified channelized STM1 IQ interface.

Options ***type-fpc/pic/port*:*channel*:*channel***—Interface type with optional corresponding channel levels. The interface type can be one of the following types:

- ***type-fpc/pic/port*:*channel***—For the physical channelized STM1 IQ interface, ***type*** is **cstm1.** For the clear channel, ***type*** is **so**. For channelization, the STM1 IQ interface must be converted to interface type **cau4**.
- ***type-fpc/pic/port*:*channel***—At the first level of channelization, ***type*** can be **ce1** or **e1 (** clear channel or fractional channel from **cau4)**.
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** is **ds** (from **ce1**).

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output
show interfaces (Channelized STM1 IQ) (Physical) on page 533
show interfaces (Channelized AU-4) (Physical) on page 534
show interfaces (Channelized E1) (Physical) on page 534
show interfaces (DS) on page 535

Output Fields See the output field table for the show interfaces (Channelized STM1) command.

Sample Output

show interfaces (Channelized STM1 IQ) (Physical)

```
user@host> show interfaces cstm1-0/0/0
```

```
Physical interface: cstm1-0/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 35
  Link-level type: Frame-relay, Controller, Clocking: Internal, SDH mode,
  Speed: OC3, Loopback: None, Parent: None  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
  Last flapped   : 2003-02-06 15:01:56 PST (07:15:06 ago)
...
```

show interfaces (Channelized AU-4) (Physical)

```
user@host> show interfaces cau4-0/0/0
Physical interface: cau4-0/0/0, Enabled, Physical link is Up
  Interface index: 147, SNMP ifIndex: 36
  Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC3,
  Loopback: None, Parent: cstm1-0/0/0 Interface index 146
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Last flapped   : 2003-02-06 19:36:31 PST (02:40:42 ago)
  SDH   alarms   : None
  SDH   defects  : None
...
```

show interfaces (Channelized E1) (Physical)

```
user@host> show interfaces ce1-0/0/0:11
Physical interface: ce1-0/0/0:11, Enabled, Physical link is Up
  Interface index: 169, SNMP ifIndex: 288
  Link-level type: Frame-relay, Controller, Clocking: Internal, Speed: E1,
  Loopback: None, Framing: G704, Parent: cau4-0/0/0 Interface index 147
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
```


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```
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
  Last flapped   : 2003-02-06 22:05:23 PST (00:13:45 ago)
  DS1   alarms   : None
  DS1   defects  : None
  SDH   alarms   : None
  SDH   defects  : None
...
```

show interfaces (DS)

```
user@host> show interfaces ds-0/0/0:11:1
Physical interface: ds-0/0/0:11:1, Enabled, Physical link is Up
  Interface index: 170, SNMP ifIndex: 289
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: Illegal, FCS: 16, Parent: ce1-0/0/0:11 Interface index 169
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  CoS Queues: 8 maximum usable queues, 4 in use
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Conf-req-sent
  Egress queues: 8 supported, 4 in use
...
  Logical interface ds-0/0/0:11:1.0 (Index 77) (SNMP ifIndex 290)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
    Protocol inet, MTU: 1500
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.134.1.0/30, Local: 10.134.1.1
DLCI 100
      Flags: Active, Dce-configured
      Total down time: 0 sec, Last down: Never
      Traffic statistics:
       Input  bytes  :                   0
       Output bytes  :                   0
       Input  packets:                   0
       Output packets:                   0
...
```

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show interfaces (Channelized STM1)

Syntax show interfaces e1-*fpc/pic/port*:*e1channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information about the specified channelized STM1 interface.

Options **e1-*fpc/pic/port*:*e1channel***—Display standard status information about the specified channelized STM1 interface.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output show interfaces extensive (Channelized STM1, SDH) on page 547

Output Fields Table 44 on page 536 lists the output fields for the **show interfaces** (all Channelized STM1 interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 44: Channelized STM1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

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Table 44: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used on the link. It can be **G704**, **G704-NO-CRC4**, or **Unframed**. The default is **G704**.	All levels
Parent	(Channelized STM1 IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **interval***seconds*—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is**1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 44: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	(PPP and HDLC) Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

ANSI LMI settingsor **ITU LMI settings**	(Frame Relay) Local Management Interface settings. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx*** seconds, where ***value*** can be: • **n391dte**—DTE full status polling interval (1- 255) • **n392dce**—DCE error threshold (1-10) • **n392dte**—DTE error threshold (1-10) • **n393dce**—DCE monitored event count (1-10) • **n393dte**—DTE monitored event count (1-10) • **t391dte**—DTE polling timer (5-30 seconds) • **t392dce**—DCE polling verification timer (5-30 seconds)	**detail extensive** none
LMI	(Frame Relay) Statistics about the link management. • **Input**—Number of packets coming in on the interface (***nn***) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)**. • **Output**—Number of packets sent out on the interface (***nn***) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last seen *hh:mm:ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 44: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay, displayed only from the DTE) Number of DLCIs configured from the DCE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none

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Table 44: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value of this field increments, the PIC is malfunctioning.	**extensive**

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Table 44: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware.	**extensive**
DS1 alarms **DS1 defects**	E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see *Bellcore Telcordia GR-499-CORE*. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none
SDH alarms **SDH defects**	SDH media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SDH PHY, SDH regenerator section, SDH multiplex section, and SDH path. NOTE: For controller-based SONET PICs, the SDH alarms and SDH defects output in the **show interface cstm1 extensive** command output only shows the section and line level defects. The path level defects can be found under the SONET (so) interface output.	All levels

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Table 44: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
E1 media	Active alarms and defects, plus counts of specific E1 errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Error types can be: • **AIS**—Alarm indication signal • **BEE**—Bit error • **BES**—Bit error seconds • **BPV**—Bipolar violation • **CS**—Carrier state • **ES**—Errored seconds • **EXZ**—Excessive zeros • **FEBE**—Far-end block error • **LCV**—Line code violation • **LES**—Line error seconds • **LOF**—Loss of frame • **LOS**—Loss of signal • **PCV**—Pulse code violation • **SEF**—Severely errored framing • **SEFS-S**—Severely errored framing seconds (section) • **SES**—Severely errored seconds • **UAS**—Unavailable seconds • **YELLOW**—Errors at the remote site receiver	**extensive**
Interface transmit queues	Names of the transmit queues and their associated statistics for each E1 channel on the Channelized STM1-to-E1 PIC. • **B/W**—Queue bandwidth as a percentage of the total interface bandwidth. • **WRR**—Weighted round-robin (in percent). • **Packets**—Number of packets transmitted. • **Bytes**—Number of bytes transmitted. • **Drops**—Number of packets dropped. • **Errors**—Number of packet errors.	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Line encoding**—Line encoding used. It is always **HDB3**.	**extensive**

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Table 44: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS1 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
SDH PHY	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **PLL Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**
SDH regenerator section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **RS-BIP8**—24-bit BIP for multiplex section overhead (B2 bytes) • **OOF**—Out of frame • **LOS**—Loss of signal • **LOF**—Loss of frame • **RS-ES**—Errored seconds (near-end regenerator section) • **RS-SES**—Severely errored seconds (near-end regenerator section) • **RS-SEFS**—Severely errored framing seconds (regenerator section)	**extensive**

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Table 44: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SDH multiplex section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **MS-BIP24**—8-bit BIP for high-order path overhead (B3 byte) • **MS-FEBE**—Far-end block error (multiplex section) • **MS-FERF**—Far-end remote fail (multiplex section) • **MS-AIS**—alarm indication signal (multiplex section) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **MS-ES**—Errored seconds (near-end multiplex section) • **MS-SES**—Severely errored seconds (near-end multiplex section) • **MS-UAS**—Unavailable seconds (near-end multiplex section) • **MS-ES-FE**—Errored seconds (far-end multiplex section) • **MS-SES-FE**—Severely errored seconds (far-end multiplex section) • **MS-UAS-FE**—Unavailable seconds (far-end multiplex section)	**extensive**
SDH path	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **HP-BIP8**—8-bit BIP for regenerator section overhead (B1 byte) • **HP-FEBE**—Far-end block error (high-order path) • **HP-LOP**—Loss of pointer (high-order path) • **HP-AIS**—High-order-path alarm indication signal • **HP-FERF**—Far-end remote fail (high-order path) • **HP-UNEQ**—Unequipped (high-order path) • **HP-PLM**—Payload label mismatch (high-order path) • **HP-ES**—Errored seconds (near-end high-order path) • **HP-SES**—Severely errored seconds (near-end high-order path) • **HP-UAS**—Unavailable seconds (near-end high-order path) • **HP-ES-FE**—Errored seconds (far-end high-order path) • **HP-SES-FE**—Severely errored seconds (far-end high-order path) • **HP-UAS-FE**—Unavailable seconds (far-end high-order path)	**extensive**

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Table 44: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SDH tu	Active alarms and defects, plus counts of specific SDH tributary unit (TU) errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **TU-BIP-2**—Bit interleaved parity for SONET line overhead • **TU-FEBE**—(near-end TU) • **TU-LOP**—Loss of pointer (near-end TU) • **TU-AIS**—Alarm indication signal (near-end TU) • **TU-FERF**—(near-end TU) • **TU-UNEQ**—Unequipped (near-end TU) • **TU-PLM**—Payload label mismatch (near-end TU) • **TU-ES**—Errored seconds (near-end TU) • **TU-SES**—Severely errored seconds (near-end TU) • **TU-UAS**—Unavailable seconds (near-end TU) • **TU-ES-FE**—Errored seconds (far-end TU) • **TU-SES-FE**—Severely errored seconds (far-end TU) • **TU-UAS-FE**—Unavailable seconds (far-end TU)	**extensive**
Received SDH overhead **Transmitted SDH overhead**	Values of the received and transmitted SONET overhead: • **C2**—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • **F1**—Section user channel byte. This byte is set aside for the purposes of users. • **K1** and **K2**—These bytes are allocated for APS signaling for the protection of the multiplex section. • **J0**—Section trace. This byte is defined for STS-1 number 1 of an STS-*N* signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • **S1**—Synchronization status. The S1 byte is located in the first STS-1 of an STS-*N* signal. • **Z3** and **Z4**—Allocated for future use.	**extensive**
Received path trace **Transmitted path trace**	Channelized OC12 interfaces allow path trace bytes to be sent inband across the SONET/SDH link. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits. This information is specific to each of the 12 channelized OC12 interfaces.	**extensive**
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**

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Table 44: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, or **mpls**.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none

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Table 44: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces extensive (Channelized STM1, SDH)

```
user@host> show interfaces e1-1/0/0:1 extensive
Physical interface: e1-1/0/0:1, Enabled, Physical link is Up
  Interface index: 148, SNMP ifIndex: 285, Generation: 2915
  Link-level type: Frame-relay, MTU: 1504, SDH mode, Speed: E1, Loopback: None,
  FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
  Hold-times     : Up 0 ms, Down 0 ms
```

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```
Last flapped   : 2002-05-23 17:02:59 PDT (17:23:45 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                  592                   48 bps
 Output bytes  :                  644                   48 bps
 Input  packets:                   46                    0 pps
 Output packets:                   46                    0 pps
Input errors:
  Errors: 0, Drops: 9, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 11, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
DS1   alarms   : None
DS1   defects  : None
SDH   alarms   : None
SDH   defects  : None
E1  media:            Seconds        Count  State
  SEF                       0            0  OK
  BEE                       0            0  OK
  AIS                     124            1  OK
  LOF                     124            1  OK
  LOS                       0            0  OK
  YELLOW                    0            0  OK
  BPV                       0            0
  EXZ                       0            0
  LCV                       0            0
  PCV                       0            0
  CS                        0            0
  FEBE                      0            0
  LES                     124
  ES                      125
  SES                     124
  SEFS                    124
  BES                       0
  UAS                      37
Interface transmit queues:
            B/W  WRR       Packets        Bytes        Drops       Errors
  Queue0     95   95             0            0            0            0
  Queue1      5    5           529         6348            0            0
HDLC configuration:
  Giant threshold: 0, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
SDH PHY:              Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                 0            0  OK
SDH regenerator section:
  RS-BIP8                   0            0
  OOF                     125            1  OK
  LOS                     125            1  OK
  LOF                     125            1  OK
  RS-ES                   125
  RS-SES                  125
  RS-SEFS                 125
SDH multiplex section:
  MS-BIP24                  0            0
  MS-FEBE                   0            0
```


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```
  MS-FERF                   0            0  OK
  MS-AIS                  125            1  OK
  BERR-SF                   0            0  OK
  BERR-SD                   0            0  OK
  MS-ES                   125
  MS-SES                  125
  MS-UAS                  115
  MS-ES-FE                  0
  MS-SES-FE                 0
  MS-UAS-FE                 0
SDH path:
  HP-BIP8                   0            0
  HP-FEBE                   0            0
  HP-LOP                    0            0  OK
  HP-AIS                  125            1  OK
  HP-FERF                   0            0  OK
  HP-UNEQ                   0            0  OK
  HP-PLM                  125            1  OK
  HP-ES                   125
  HP-SES                  125
  HP-UAS                  115
  HP-ES-FE                  0
  HP-SES-FE                 0
  HP-UAS-FE                 0
SDH tu:
  TU-BIP2                   0            0
  TU-FEBE                 124            1
  TU-LOP                    0            0  OK
  TU-AIS                  124            1  OK
  TU-FERF                 124            1  OK
  TU-UNEQ                   0            0  OK
  TU-PLM                  124            1  OK
  TU-ES                   125
  TU-SES                  125
  TU-UAS                  115
  TU-ES-FE                  0
  TU-SES-FE                 0
  TU-UAS-FE                 0
Received SDH overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x02, C2(cmp) : 0x02, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00, V5      : 0x02
  V5(cmp) : 0x02
Transmitted SDH overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x02, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00, V5      : 0x02
Received path trace:
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
Transmitted path trace:
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 2 (0x07)
CoS information:
  CoS transmit queue              Bandwidth           Buffer Priority   Limit
                             %          bps   %         usec
  0 best-effort             95      1945600  95            0      low    none
  3 network-control          5       102400   5            0      low    none
Logical interface e1-1/0/0:1.0 (Index 10) (SNMP ifIndex 369) (Generation 496)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 575, Route table: 0
```

```
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 19.19.19.3, Local: 19.19.19.4, Broadcast: Unspecified,
      Generation: 975
  DLCI 100
    Flags: Active, Dce-configured
    Total down time: 0 sec, Last down: Never
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
DLCI statistics:
  Active DLCI  :2 Inactive DLCI  : 0
```


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show interfaces (Channelized T1 IQ)

Syntax

show interfaces (ct1-*fpc/pic/port* | *type-fpc/pic/port*<:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced in Junos OS Release 7.4.

Description

(M Series and T Series routers only) Display status information about the specified channelized T1 IQ interface.

Options

type-fpc/pic/port*:*channel—Interface type. With optional corresponding channel levels, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized T1 IQ interface, ***type*** is **ct1.**
- ***type-fpc/pic/port*:*channel***—For the clear channel, ***type*** is **t1**. At the first level of channelization, ***type*** can be **ct1** or **t1.**
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ds**.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces extensive (CT1) on page 559
show interfaces extensive (T1) on page 560
show interfaces extensive (DS0) on page 561

Output Fields

Table 45 on page 551 lists the output fields for the **show interfaces** (Channelized T1 IQ and T3 IQ interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels

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Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used on the link. It can be **ESF** or **SF**. The default is **ESF**.	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	Configured settings for keepalives. • **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

LMI settings	(Frame Relay) Settings for Local Management Interface (LMI) can be either **ANSI LMI settings** or **ITU LMI settings**. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx seconds***, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) LMI packet statistics: • **Input**—Number of packets coming in on the interface (***nn***) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)**. • **Output**—Number of packets sent out on the interface (***nn***) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh:mm:ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communication equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the**Success** state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*****hour:minute:second*** **ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none

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Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS queues	Number of CoS queues configured.	**detail extensive** none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface. • **Input packets, Output packets**—Number of packets received and transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Giants**—Number of frames received that are larger than the giant threshold. • **Runts**—Number of frames received that are smaller than the runt threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Counter increments when the software could not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets whose size exceeds the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
DS1 alarms DS1 defects	Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
T1 media	Counts of T1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 media-specific error types can be: • **AIS**—Alarm indication signal • **BEE**—Bit error event • **BES**—Bit error seconds • **BPV**—Bipolar violation • **CS**—Carrier state • **ES**—Errored seconds • **EXZ**—Excessive zeros • **FEBE**—Far-end block error • **LCV**—Line code violation • **LES**—Line error seconds • **LOF**—Loss of frame • **LOS**—Loss of signal • **PCV**—Pulse code violation • **SEF**—Severely errored framing • **SEFS**—Severely errored framing seconds (section) • **SES**—Severely errored seconds • **UAS**—Unavailable seconds • **YELLOW**—Errors at the remote site receiver	**extensive**
Line encoding	Line encoding used: **B8ZS** or **AMI**.	All levels
Buildout	Buildout setting.	All levels
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Line encoding**—Line encoding used: **B8ZS** or **AMI**. • **Byte encoding**—Byte encoding used: **Nx64K** or **Nx56K**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**. • **Idle cycle Flag**—Idle cycle flags. • **Start end Flag**—Start and end flag.	**extensive**

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Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS0 or DS1 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface; values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	**All levels**
Encapsulation	Encapsulation on the logical interface.	**All levels**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, or **mpls**.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none

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Table 45: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces extensive (CT1)

```
user@host> show interfaces extensive ct1-0/1/1
Physical interface: ct1-0/1/1, Enabled, Physical link is Up
   Interface index: 145, SNMP ifIndex: 32, Generation: 28
   Link-level type: Controller, Clocking: Internal, Speed: T1,
   Loopback: None, Framing: ESF, Parent: None
 Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps 16384
   Link flags     : None
   Hold-times     : Up 0 ms, Down 0 ms
   CoS queues     : 4 supported
   Last flapped   : 2005-08-17 11:47:09 PDT (1d 03:38 ago)
   Statistics last cleared: 2005-08-18 15:25:37 PDT (00:00:27 ago)
   DS1   alarms   : None
   DS1   defects  : None
   T1  media:            Seconds        Count  State
     SEF                       0            0  OK
     BEE                       0            0  OK
     AIS                       0            0  OK
     LOF                       0            0  OK
     LOS                       0            0  OK
     YELLOW                    0            0  OK
     BPV                       0            0
     EXZ                       0            0
     LCV                       0            0
     PCV                       0            0
     CS                        0            0
     LES                       0
     ES                        0
     SES                       0
     SEFS                      0
     BES                       0
```

```
    UAS                      0
    Line encoding: B8ZS
    Buildout       : 0 to 132 feet
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
```

show interfaces extensive (T1)

```
user@host> show interfaces extensive t1-0/2/0
Physical interface: t1-0/2/0, Enabled, Physical link is Up
   Interface index: 161, SNMP ifIndex: 33, Generation: 61
   Link-level type: PPP, MTU: 1504, Speed: T1, Loopback: None, FCS: 16,
   Parent: ct1-0/2/0 Interface index 148
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps 16384
   Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
   Hold-times     : Up 0 ms, Down 0 ms
   CoS queues     : 4 supported
   Last flapped   : 2005-09-07 15:43:47 PDT (00:00:06 ago)
   Statistics last cleared: Never
   Traffic statistics:
    Input  bytes  :                   0                   0 bps
    Output bytes  :                  14                   0 bps
    Input  packets:                   0                   0 pps
    Output packets:                   1                   0 pps
   Input errors:
     Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
     Policed discards: 0, L3 incompletes: 0,
     L2 channel errors: 0, L2 mismatch timeouts: 0,
     HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
   Output errors:
     Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0,
     MTU errors: 0, Resource errors: 0
   Queue counters:       Queued packets  Transmitted packets Dropped packets
     0 best-effort                    0                   0               0
     1 expedited-fo                   0                   0               0
     2 assured-forw                   0                   0               0
     3 network-cont                   1                   1               0
   DS1   alarms   : None
```


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```
  DS1   defects  : None
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 1514, Runt threshold: 2
    Timeslots      : All active
    Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag:
    flags, Start end flag: shared
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)
```

show interfaces extensive (DS0)

```
user@host> show interfaces extensive ds-0/1/0:0
Physical interface: ds-0/1/0:1, Enabled, Physical link is Up
   Interface index: 157, SNMP ifIndex: 52, Generation: 46
   Link-level type: Frame-Relay, PPP, MTU: 1504, Clocking: Internal,
   Speed: 640kbps, Loopback: None, FCS:16,
   Parent: ct1-0/1/0 Interface index 143
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps 16384
   Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
   Hold-times     : Up 0 ms, Down 0 ms
   Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
   Keepalive statistics:
     Input : 8 (last seen 00:00:12 ago)
     Output: 8 (last sent 00:00:07 ago)
   LCP state: Opened
   NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
   mpls: Not-configured
   CHAP state: Not-configured
   CoS queues     : 4 supported
   Last flapped   : 2005-08-18 15:23:46 PDT (00:03:17 ago)
   Statistics last cleared: 2005-08-18 15:25:37 PDT (00:01:26 ago)
   Traffic statistics:
    Input  bytes  :                  840                    0 bps
    Output bytes  :                  912                    0 bps
    Input  packets:                   25                    0 pps
    Output packets:                   26                    0 pps
   Input errors:
     Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
     Policed discards: 0, L3 incompletes: 0,
```

```
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0,
    MTU errors: 0, Resource errors: 0
  Queue counters:       Queued packets  Transmitted packets Dropped packets
    0 best-effort                   0                    0               0
    1 expedited-fo                  0                    0               0
    2 assured-forw                  0                    0               0
    3 network-cont                 26                   26               0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 2
    Timeslots      : 1-10
    Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
    Start end flag: shared
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)
Logical interface ds-0/1/0:1.0 (Index 67) (SNMP ifIndex 53) (Generation 11)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 26, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 11.11.11.0/30, Local: 11.11.11.2, Broadcast: 11.11.11.3,
        Generation: 39
   DLCI 100
     Flags: Active, Dce-configured
     Total down time: 0 sec, Last down: Never
     Traffic statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
 DLCI statistics:
   Active DLCI  :2 Inactive DLCI  : 0
...
```


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show interfaces (Channelized T3 IQ)

Syntax

show interfaces (ct3-*fpc/pic/port* | *type-fpc/pic/port*<:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

(M Series and T Series routers only) Display status information about the specified channelized T3 IQ interface.

Options

type-fpc/pic/port*:*channel—Interface type. With optional corresponding channel levels, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized T3 IQ interface, ***type*** is **ct3**.
- ***type-fpc/pic/port*:*channel***—For the clear channel, ***type*** is **t3**. At the first level of channelization, ***type*** can be **ct1** or **t1**.
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** is **ds**.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces extensive (Channelized T3 IQ) (Physical) on page 564
show interfaces extensive (Channelized T1 on Channelized T3 IQ) on page 564
show interfaces extensive (DS0 on Channelized T3 IQ) on page 564

Output Fields

See the output field table for the show interfaces (Channelized T1 IQ) command.

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Sample Output

show interfaces extensive (Channelized T3 IQ) (Physical)

```
user@host> show interfaces extensive ct3-0/0/1
Physical interface: ct3-0/0/1, Enabled, Physical link is Up
  Interface index: 30, SNMP ifIndex: 317, Generation: 29
  Link-level type: Controller, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (Channelized T1 on Channelized T3 IQ)

```
user@host> show interfaces extensive ct1-0/0/1:2
Physical interface: ct1-0/0/1:2, Enabled, Physical link is Up
  Interface index: 175, SNMP ifIndex: 1505, Generation: 174
  Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF, Parent: ct3-0/0/1 (Index 32)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (DS0 on Channelized T3 IQ)

```
user@host> show interfaces extensive ds-0/0/1:2:1
Physical interface: ds-0/0/1:2:1, Enabled, Physical link is Up
  Interface index: 176, SNMP ifIndex: 1563, Generation: 175
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Parent: ct1-0/0/1:2(Index 175)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
...
```


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show interfaces (Channelized E1)

Syntax show interfaces ds-*fpc/pic/port:ds0channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information the specified channelized E1 interface.

Options

ds-*fpc/pic/port:ds0channel*—Display standard information about the specified channelized E1 interface.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output show interfaces extensive (Channelized E1) on page 573

Output Fields Table 42 on page 495 lists the output fields for the **show interfaces** (Channelized E1 and Channelized E1 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

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Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used on the link. It can be **G704**, **G704-NO-CRC4**, or **Unframed**. The default is **G704**.	All levels
Parent	(Channelized E1 IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **Interval *seconds***—Time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **Down-count *number***—Number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **Up-count *number***—Number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	(PPP and HDLC) Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  ◦ (**last seen 00:00:00 ago**)—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  ◦ (**last seen 00:00:00 ago**)—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

LMI settings	(Frame Relay) Settings for link management can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx*** seconds, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) Statistics about the link management. • **Input**—Number of packets coming in on the interface (*nn*) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)** • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh:mm:ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for**n392dte** or **n393dce** intervals. (See **LMI settings**).	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay, displayed only from the DTE) Number of DLCIs configured from the DCE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none
CoS Queues	Number of CoS queues configured.	**detail extensive** none
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output Rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**

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Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Traffic statistics	Number of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Giants**—Number of frames received that are larger than the giant threshold. • **Runts**—Number of frames received that are smaller than the runt threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), then either the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets larger than the MTU threshold. • **Resource errors**—Sum of transmit drops.	**extensive**
DS1 alarms **DS1 defects**	E1 media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see *Bellcore Telcordia GR-499-CORE*. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
E1 media	Active alarms and defects, plus counts of specific E1 errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than OK indicates a problem. The E1 media-specific error types can be: • **SEF**—Severely errored framing • **BEE**—Bit error • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **YELLOW**—Errors at the remote site receiver • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CS**—Carrier state • **FEBE**—Far-end block error • **LES**—Line error seconds • **ES**—Errored seconds • **BES**—Bursty errored seconds • **SES**—Severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Line encodingHDB3**—Line encoding used.	**extensive**
Interface transmit queues	Names of the transmit queues and their associated statistics for each DS0 channel on the Channelized E1 to DS0 PIC. • **B/W**—Queue bandwidth as a percentage of the total interface bandwidth. • **WRR**—Weighted round robin (in percent). • **Packets**—Number of packets transmitted. • **Bytes**—Number of bytes transmitted. • **Drops**—Number of packets dropped. • **Errors**—Number of packet errors.	**extensive**

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Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS*x* BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified

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Table 46: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Traffic statistics	Number and rate of bytes and packets received and transmitted on the logical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than one second) for this counter to stabilize.	**detail extensive**
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, **mpls**.	**detail extensive** none
Multilink bundle	(Multilink) Interface name for the multilink bundle, if configured.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces extensive (Channelized E1)

```
user@host> show interfaces ds-0/1/1:1 extensive
```

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```
Physical interface: ds-0/1/1:1, Enabled, Physical link is Down
  Interface index: 163, SNMP ifIndex: 37, Generation: 46
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : 2005-12-28 14:44:06 PST (00:00:30 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                    0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
     Resource errors: 0
  DS1   alarms   : LOF, LOS
  DS1   defects  : LOF, LOS
  E1  media:            Seconds        Count  State
    SEF                  982318            1  Defect Active
    BEE                       0            0  OK
    AIS                       0            0  OK
    LOF                  982318            1  Defect Active
    LOS                  982318            1  Defect Active
    YELLOW                    0            0  OK
    BPV                       1            1
    EXZ                       1            1
    LCV                       1            1
    PCV                       1            2
    CS                        0            0
    FEBE                      1            9
    LES                       1
    ES                   982318
    SES                  982318
    SEFS                 982318
    BES                       1
    UAS                       0
  Interface transmit queues:
              B/W  WRR       Packets        Bytes        Drops       Errors
    Queue0     95   95             0            0            0            0
    Queue1      5    5             0            0            0            0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 3
    Timeslots      : 31
    Line encoding: HDB3, Data inversion: Disabled, Idle cycle flag: flags,
    Start end flag: shared
  DS1 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^11 - 1, O.152 and O.153 (2047 type),
     Pseudorandom (8)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 2 (0x1b)
  CoS information:
    CoS transmit queue     Bandwidth        Buffer   Priority   Limit
```


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```
                     %         bps     %   usec
0 best-effort       95     1945600    95      0          low    none
3 network-control    5      102400     5      0          low    none
```

show interfaces (Channelized E1 IQ)

Syntax show interfaces (ce1-*fpc/pic/port* | *type-fpc/pic/port*<:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information about the specified channelized E1 IQ interface.

Options ***type-fpc/pic/port*:<*channel*>**—Interface type with optional corresponding channel levels. For the physical channelized E1 IQ interface, ***type*** is **ce**. For the clear channel, ***type*** is **e1**. At the first level of channelization, ***type*** is **ds**.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output
show interfaces (Channelized E1 IQ) (Physical) on page 576
show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation) on page 577
show interfaces extensive (Channelized E1 IQ MLFR Encapsulation) on page 578
show interfaces detail (Clear Channel E1) on page 579

Output Fields For information about output fields, see the output field table for the show interfaces (Channelized E1) command. Output fields are listed in the approximate order in which they appear.

Sample Output

show interfaces (Channelized E1 IQ) (Physical)

```
user@host> show interfaces ce1-1/2/3
Physical interface: ce1-1/2/3, Enabled, Physical link is Up
  Interface index: 18, SNMP ifIndex: 1128
  Link-level type: Frame-relay, Controller, MTU: 1504, Clocking: Internal,   Speed:
 E1, Loopback: None, FCS: 16, Framing: G704, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
```


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```
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                     : 43186
    Full enquiries sent                : 8515
    Enquiry responses received         : 43185
    Full enquiry responses received    : 8515
  DCE statistics:
    Enquiries received                 : 0
    Full enquiries received            : 0
    Enquiry responses sent             : 0
    Full enquiry responses sent        : 0
  Common statistics:
    Unknown messages received          : 0
    Asynchronous updates received      : 0
    Out-of-sequence packets received   : 0
    Keepalive responses timedout       : 0
  Nonmatching DCE-end DLCIs:
          2
  Last flapped   : 2002-10-04 17:52:51 PDT (00:32:57 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None
```

show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation)

```
user@host> show interfaces ds-0/3/4:1 extensive
Physical interface: ds-0/3/4:1, Enabled, Physical link is Up
  Interface index: 151, SNMP ifIndex: 63, Generation: 34
  Link-level type: Multilink-PPP, MTU: 1518, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16,
  Parent: ce1-0/3/4 Interface index 150
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  CHAP state: Closed
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : Never
  Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :             6070570                 224 bps
   Input  packets:                   0                   0 pps
   Output packets:              209330                   0 pps
  Input errors:
    Errors: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
     Resource errors: 0
  HDLC configuration:
    Giant threshold: 1528, Runt threshold: 2
    Timeslots      : 1
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
```

```
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)

  Logical interface ds-0/3/4:1.0 (Index 74) (SNMP ifIndex 64) (Generation 13)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol mlppp, Multilink bundle: ls-0/1/0.0, MTU: 1514, Generation: 24,
    Route table: 0
```

show interfaces extensive (Channelized E1 IQ MLFR Encapsulation)

```
user@host> show interfaces ds-0/3/4:5 extensive
Physical interface: ds-0/3/4:5, Enabled, Physical link is Up
  Interface index: 155, SNMP ifIndex: 72, Generation: 38
  Link-level type: Multilink-FR, MTU: 1518, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16,
  Parent: ce1-0/3/4 Interface index 150
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : No-Keepalives DCE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n392dce 3, n393dce 4, t392dce 15 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  DTE statistics:
    Enquiries sent                      : 0
    Full enquiries sent                 : 0
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
    Keepalive responses timedout        : 0
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : 2005-12-21 09:59:01 PST (1w0d 03:44 ago)
  Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
  Input errors:
    Errors: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
     Resource errors: 0
  HDLC configuration:
    Giant threshold: 1528, Runt threshold: 2
    Timeslots      : 5
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
```


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```
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x01)

  Logical interface ds-0/3/4:5.0 (Index 78) (SNMP ifIndex 73) (Generation 17)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                    0 bps
     Output bytes  :                   0                    0 bps
     Input  packets:                   0                    0 pps
     Output packets:                   0                    0 pps
    Protocol mlfr, Multilink bundle: ls-0/1/0.1, MTU: 1514, Generation: 28, Route
 table: 0
    DLCI 10
      Flags: Active
      Total down time: 0 sec, Last down: Never
      Traffic statistics:
       Input  bytes  :                 0
       Output bytes  :                 0
       Input  packets:                 0
       Output packets:                 0
  DLCI statistics:
    Active DLCI  :1  Inactive DLCI  :0
```

show interfaces detail (Clear Channel E1)

```
user@host> show interfaces e1-1/2/6 detail
Physical interface: e1-1/2/6, Enabled, Physical link is Up
  Interface index: 89, SNMP ifIndex: 1278, Generation: 341
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1, Loopback:None,
...
  Logical interface e1-1/2/6.0 (Index 52) (SNMP ifIndex 1279) (Generation 169)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
...
```

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show interfaces (T1, E1, or DS)

Syntax

show interfaces *interface-type*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

Display status information about the specified T1, E1, or DS interface.

Options

interface-type—On ACX Series, M Series, MX Series, and T Series routers, the T1 interface type is **t1-*fpc/pic/port***, whereas the E1 interface type is **e1-*fpc/pic/port***, and DS interface type is **ds-*fpc/pic/port*:<channel>**. On the J Series routers, the T1 interface type is **t1-*pim*/0/*port***, whereas the E1 interface type is **e1-*pim*/0/*port***.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

Related Documentation

- *Understanding Interfaces on ACX Series Universal Access Routers*

List of Sample Output

show interfaces (T1, IMA Link) on page 592
show interfaces (T1, PPP) on page 593
show interfaces detail (T1, PPP) on page 593
show interfaces extensive (T1 CRC Errors) on page 594
show interfaces extensive (T1, PPP) on page 594
show interfaces (E1, Frame Relay) on page 596
show interfaces detail (E1, Frame Relay) on page 597
show interfaces extensive (E1, Frame Relay) on page 598
show interfaces (E1, IMA Link) on page 600
show interfaces extensive (T1, TDM-CCC-SATOP) on page 601
show interfaces extensive (DS, TDM-CCC-CESoPSN) on page 602

Output Fields

Table 47 on page 581 lists the output fields for the **show interfaces** (T1 or E1) command. Output fields are listed in the approximate order in which they appear.

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Table 47: T1 or E1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used for the E1 interface on the link: **G704**, **G704-NO-CRC4**, or **Unframed**. The default is **G704**. Physical layer framing format used for the T1 interface on the link: **SF** and **ESF**. The default is **ESF**.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**

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Table 47: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
IMA Link alarms	Current active IMA link alarms, including the following: • **LIF** • **LODS** • **RFI-IMA** • **Tx-Mis-Connected** • **Tx-Unusable-FE** • **Rx-Unusable-FE** • **Link Fault**	**detail extensive** none
IMA Link defects	Current active IMA link defects, including the following: • **LIF** • **LODS** • **RFI-IMA** • **Tx-Mis-Connected** • **Tx-Unusable-FE** • **Rx-Unusable-FE** • **Link Fault**	**detail extensive** none

IMA Link state	Current active IMA link status, including the following:
	• **Line:** synchronized or not synchronized
	• **Near end:**—Status of near-end receive and transmit links
	  ◦ **Rx:** Usable or Unusable
	  ◦ **Tx:** Usable or Unusable
	• **Far end:**—Status of far-end receive and transmit links
	  ◦ **Rx:** Usable or Unusable
	  ◦ **Tx:** Usable or Unusable
		detail extensive none

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Table 47: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
IMA link media	IMA Link Media Status, which provides the seconds and count state for the following link media parameters: • LIF • LODS • Err-ICP • IV • Rx-FC • Tx-FC • FE-Defects • FE-Rx-FC • FE-Tx-FC • Rx-ICP • Rx-Stuff • Tx-ICP • Tx-Stuff • Rx-SES • Rx-UAS • Rx-UUS • Tx-UUS • FE-Rx-SES • FE-Rx-UAS • FE-Rx-UUS • FE-Tx-UUS	**detail extensive** none
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

Keepalive statistics	(PPP and HDLC) Information about keepalive packets. (When no level of output is specified, the word **statistics** is not part of the field name and the **last seen** text is not displayed.)
	• **Input**—Number of keepalive packets received by PPP.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

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Table 47: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
LMI settings	(Frame Relay) Settings for Local Management Interface (LMI) which can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx*** seconds, where *value* can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) Local Management Interface (LMI) packet statistics: • **Input**—Number of packets coming in on the interface (***nn***) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh*:*mm*:*ss* ago)**. • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh*:*mm*:*ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communications equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 47: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no Local Management Interface (LMI) packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE.) Number of DLCIs configured from the DCE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) State of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response is not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Down**—CHAP authentication is incomplete (not yet completed or has failed). • **Not-configured**—CHAP is not configured on the interface. • **Opened**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago).**	**detail extensive** none

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Table 47: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS Queues	Number of CoS queues configured.	**detail extensive** none
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC or PIM. If the value of this field increments, the PIC or PIM is malfunctioning. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 47: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
DS1 alarms **DS1 defects**	E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see *Bellcore Telcordia GR-499-CORE*. • **AIS**—Alarm indication signal. • **LOF**—Loss of frame. • **LOS**—Loss of signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 47: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
T1 media or **E1 media**	Counts of T1 or E1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 or E1 media-specific error types are: • **SEF**—Severely errored framing • **BEE**—Bit error • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **YELLOW**—Errors at the remote site receiver • **CRC Major**—Cyclic redundancy check major alarm threshold exceeded • **CRC Minor**—Cyclic redundancy check minor alarm threshold exceeded • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CS**—Carrier state • **CRC**—Cyclic redundancy check • **FEBE**—Far-end block error (E1 only) • **LES**—Line error seconds • **ES**—Errored seconds • **BES**—Bursty errored seconds • **SES**—Severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
SAToP Configuration	Information about the SAToP configuration. • **payload-size**—Configure the payload size, in bytes (from 32 through 1024 bytes). • **idle-pattern**—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • **jitter-buffer-packets**—Number of packets in the jitter buffer (from 1 through 64 packets). • **jitter-buffer-latency**—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • **excessive-packet-loss-rate**—Set packet loss options. The options are **groups**, **sample-period**, and **threshold**. • **sample-period**—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • **threshold**—Percentile designating the threshold of excessive packet loss rate (1–100 percent).	**extensive**

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Table 47: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CESoPSN Configuration	Information about the CESoPSN configuration. • **packetization-latency**—Time required to create packets (from 1000 through 8000 microseconds). • **idle-pattern**—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • **jitter-buffer-packets**—Number of packets in the jitter buffer (from 1 through 64 packets). • **jitter-buffer-latency**—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • **excessive-packet-loss-rate**—Set packet loss options. The options are **sample-period** and **threshold**. • **sample-period**—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • **threshold**—Percentile designating the threshold of excessive packet loss rate (1–100 percent).	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Time slots configured on the interface. • **Buildout**—(T1 only) Buildout setting: 0-132, 133-265, 266-398, 399-531, or 532-655 feet. • **Timeslots**—Configured time slots for the interface. • **Byte encoding**—(T1 only) Byte encoding used: **Nx64K** or **Nx56K**. • **Line encoding**—Line encoding used. For T1, the value can be **B8ZS** or **AMI**. For E1, the value is **HDB3**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**. • **Idle cycle flag**—Idle cycle flags. • **Start end flag**—Start and end flag.	**extensive**
DS1 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**

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Table 47: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes a while (generally, less than 1 second) for this counter to stabilize.	**detail extensive**

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Table 47: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter normally stabilizes in less than 1 second.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, **mlfr**, or **mpls**.	**detail extensive** none
Multilink bundle	Interface name for the multilink bundle, if configured.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive** none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics** or (**Input packets, Output packets**). **Flags** can be one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **DCE-Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **DCE-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

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Table 47: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CE Info	Information related to the circuit emulation statistics. • **CE Tx**—Number of transmitted packets and bytes (TDM to PSN flow). • **CE Rx**—Number of received packets and bytes and forward bytes (PSN to TDM flow). • **CE Rx Forwarded**—Number of forwarded bytes. • **CE Strayed**—Number of stray packets. • **CE Lost**—Number of lost packets. • **CE Malformed**—Number of malformed packets • **CE Misinserted**—Number of misinserted packets. • **CE AIS dropped**—Number of dropped bytes due to buffer overrun (PSN to TDM). • **CE Dropped**—Number of dropped packets during resynchronization • **CE Overrun Events**—Number of overrun events. • **CE Underrun Events**—Number of underrun events.	**extensive**

Sample Output

show interfaces (T1, IMA Link)

```
user@host> show interfaces t1-1/0/0
  IMA Link alarms   : None
  IMA Link defects  : LIF, LODS
  IMA Link state:
    Line     : Not synchronized
    Near end : Rx: Unusable, Tx: Usable
    Far  end : Rx: Unusable, Tx: Usable
  IMA link media:          Seconds        Count  State
    LIF                                       0  OK
    LODS                                      0  OK
    Err-ICP                                   0  OK
    IV                                        0  OK
    Rx-FC                                     0  OK
    Tx-FC                                     0  OK
    FE-Defects                                0
    FE-Rx-FC                                  0
    FE-Tx-FC                                  0
    Rx-ICP                                    0
    Rx-Stuff                                  0
    Tx-ICP                                   11
    Tx-Stuff                                  0
    Rx-SES                    0
    Rx-UAS                    0
    Rx-UUS                    1
    Tx-UUS                    0
    FE-Rx-SES                 0
    FE-Rx-UAS                 0
    FE-Rx-UUS                 0
    FE-Tx-UUS                 0
```


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show interfaces (T1, PPP)

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:35 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 72 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None

  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255
```

show interfaces detail (T1, PPP)

```
user@host> show interfaces t1-1/1/0 detail
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:52 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                 798                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                  42                   0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                   0                   0

    1 expedited-fo                   0                   0                   0
```

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```
    2 assured-forw                 0                 0                 0

    3 network-cont                40                40                 0

  DS1   alarms   : None
  DS1   defects  : None
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1
  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 14, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 18
```

show interfaces extensive (T1 CRC Errors)

```
user@host> show interfaces t1-3/2/0:1:1 extensive
Physical interface: t1-3/2/0:1:1, Enabled, Physical link is Down
  Interface index: 179, SNMP ifIndex: 79, Generation: 180
  :
  :
  DS1   alarms   : AIS, LOF, CRC Major, CRC Minor
  DS1   defects  : AIS, LOF, CRC Major, CRC Minor
  T1  media:            Seconds        Count  State
    SEF                       1            1  OK
    BEE                       1            1  OK
    AIS                    1128            1  Defect Active
    LOF                    1128            1  Defect Active
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    CRC Major               154            1  Defect Active
    CRC Minor               154            1  Defect Active
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CS                        0            0
    CRC                     154        15400
    ...
```

show interfaces extensive (T1, PPP)

```
user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
```


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```
CHAP state: Closed
CoS queues     : 4 supported, 4 in use
Last flapped   : 2005-12-05 08:43:06 PST (02:13:54 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                    0                    0 bps
 Output bytes  :                  817                   72 bps
 Input  packets:                    0                    0 pps
 Output packets:                   43                    0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

  Resource errors: 0
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort                   0                    0                    0

  1 expedited-fo                  0                    0                    0

  2 assured-forw                  0                    0                    0

  3 network-cont                 42                   42                    0

DS1   alarms   : None
DS1   defects  : None
T1  media:            Seconds        Count  State
  SEF                       1            1  OK
  BEE                       0            0  OK
  AIS                       0            0  OK
  LOF                       1            1  OK
  LOS                       0            0  OK
  YELLOW                    1            1  OK
  BPV                       1            1
  EXZ                       1            1
  LCV                       1        65535
  PCV                       1         1023
  CS                        0            0
  LES                       1
  ES                        1
  SES                       1
  SEFS                      1
  BES                       0
  UAS                       0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : All active
  Line encoding: B8ZS
  Buildout       : 0 to 132 feet
  Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
  Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1
Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 1 (0x00)
```

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```
  CoS information:
    CoS transmit queue       Bandwidth          Buffer   Priority    Limit
                          %          bps     %     usec
    0 best-effort        95      1459200    95        0        low    none
    3 network-control     5        76800     5        0        low    none

  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 14, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 18
```

show interfaces (E1, Frame Relay)

```
user@host> show interfaces e1-3/0/0
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 0 (never), Output: 11 (00:00:05 ago)
  DTE statistics:
    Enquiries sent                      : 10
    Full enquiries sent                 : 1
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
    Keepalive responses timedout        : 1
  CoS queues     : 8 supported
  Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None
  Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Input packets : 0
  Output packets: 0
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255
    DLCI 100
      Flags: Down, DCE-Unconfigured
      Total down time: 00:01:13 sec, Last down: 00:01:13 ago
      Input packets : 0
      Output packets: 0
```


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```
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces detail (E1, Frame Relay)

```
user@host> show interfaces e1-3/0/0 detail
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37, Generation: 69
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 12 (last sent 00:00:02 ago)
  DTE statistics:
    Enquiries sent                      : 10
    Full enquiries sent                 : 2
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
    Keepalive responses timedout        : 1
  CoS queues     : 8 supported
  Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                 225                  56 bps
   Input  packets:                   0                   0 pps
   Output packets:                  15                   0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 limited                       0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 real-plus                     0                   0                   0

    3 network-cont                 15                  15                   0

  DS1   alarms   : None
  DS1   defects  : None
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
```

```
    Input  packets:                    0
    Output packets:                    0
  Local statistics:
    Input  bytes  :                    0
    Output bytes  :                    0
    Input  packets:                    0
    Output packets:                    0
  Transit statistics:
    Input  bytes  :                    0                    0 bps
    Output bytes  :                    0                    0 bps
    Input  packets:                    0                    0 pps
    Output packets:                    0                    0 pps
  Protocol inet, MTU: 1500, Generation: 32, Route table: 0
    Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
      Generation: 42
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:01:18 sec, Last down: 00:01:18 ago
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
DLCI statistics:
  Active DLCI  :0  Inactive DLCI  :1
```

show interfaces extensive (E1, Frame Relay)

```
user@host> show interfaces e1-3/0/0 extensive
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37, Generation: 69
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 12 (last sent 00:00:05 ago)
  DTE statistics:
    Enquiries sent                     : 10
    Full enquiries sent                : 2
    Enquiry responses received         : 0
    Full enquiry responses received    : 0
  DCE statistics:
    Enquiries received                 : 0
    Full enquiries received            : 0
    Enquiry responses sent             : 0
    Full enquiry responses sent        : 0
  Common statistics:
    Unknown messages received          : 0
    Asynchronous updates received      : 0
    Out-of-sequence packets received   : 0
    Keepalive responses timedout       : 1
  CoS queues     : 8 supported
  Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Statistics last cleared: Never
```


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```
Traffic statistics:
 Input  bytes  :                    0                    0 bps
 Output bytes  :                  225                    0 bps
 Input  packets:                    0                    0 pps
 Output packets:                   15                    0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 17, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 limited                        0                    0                    0

  1 expedited-fo                   0                    0                    0

  2 real-plus                      0                    0                    0

  3 network-cont                  15                   15                    0

DS1   alarms   : None
DS1   defects  : None
E1  media:            Seconds        Count  State
  SEF                       0            0  OK
  BEE                       5            5  OK
  AIS                       0            0  OK
  LOF                     245           15  OK
  LOS                     245            4  OK
  YELLOW                    0           11  OK
  BPV                       0            0
  EXZ                       9            9
  LCV                       0            0
  PCV                       0            0
  CS                        0            0
  FEBE                      0            0
  LES                       0
  ES                        0
  SES                       0
  SEFS                      0
  BES                       0
  UAS                     271
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1506, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3, Data inversion: Disabled, Idle cycle flag: flags,
  Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 3, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue       Bandwidth          Buffer   Priority    Limit
                         %          bps     %     usec
  0 limited             95      1945600    95        0        low     none
  3 network-control      5       102400     5        0        low     none
Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
```

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```
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                    0 bps
     Output bytes  :                   0                    0 bps
     Input  packets:                   0                    0 pps
     Output packets:                   0                    0 pps
    Protocol inet, MTU: 1500, Generation: 32, Route table: 0
      Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
        Generation: 42
    DLCI 100
      Flags: Down, DCE-Unconfigured
      Total down time: 00:01:21 sec, Last down: 00:01:21 ago
      Traffic statistics:
       Input  bytes  :                  0
       Output bytes  :                  0
       Input  packets:                  0
       Output packets:                  0
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces (E1, IMA Link)

```
user@host> show interfaces e1-1/0/0
  IMA Link alarms   : None
  IMA Link defects  : LIF, LODS
  IMA Link state:
    Line     : Not synchronized
    Near end : Rx: Unusable, Tx: Usable
    Far  end : Rx: Unusable, Tx: Usable
  IMA link media:          Seconds        Count  State
    LIF                                       0
    LODS                                      0
    Err-ICP                                   0
    IV                                        0
    Rx-FC                                     0
    Tx-FC                                     0
    FE-Defects                                0
    FE-Rx-FC                                  0
    FE-Tx-FC                                  0
    Rx-ICP                                    0
    Rx-Stuff                                  0
    Tx-ICP                                   11
    Tx-Stuff                                  0
    Rx-SES                    0
    Rx-UAS                    0
    Rx-UUS                    1
    Tx-UUS                    0
    FE-Rx-SES                 0
    FE-Rx-UAS                 0
```


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```
    FE-Rx-UUS                   0
    FE-Tx-UUS                   0
```

show interfaces extensive (T1, TDM-CCC-SATOP)

```
user@host>show interfaces t1-1/0/0:1:1 extensive
Physical interface: t1-1/0/0:1:1, Enabled, Physical link is Down
  Interface index: 153, SNMP ifIndex: 579, Generation: 817
  Link-level type: TDM-CCC-SATOP, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-1/0/0:1 Interface index 152
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2012-10-28 02:12:40 PDT (22:32:13 ago)
  Statistics last cleared: 2012-10-29 00:44:52 PDT (00:00:01 ago)
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 assured-forw                  0                   0                   0

    3 network-cont                  0                   0                   0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  DS1   alarms   : None
  DS1   defects  : None
  T1  media:            Seconds        Count  State
    SEF                         0            0  OK
    BEE                         0            0  OK
    AIS                         0            0  OK
    LOF                         0            0  OK
    LOS                         0            0  OK
    YELLOW                      0            0  OK
    CRC Major                   0            0  OK
    CRC Minor                   0            0  OK
    BPV                         0            0
    EXZ                         0            0
    LCV                         0            0
    PCV                         0            0
    CS                          0            0
    CRC                         0            0
    LES                         0
    ES                          0
    SES                         0
    SEFS                        0
    BES                         0
    UAS                         0
  SAToP configuration:
    Payload size: 192
    Idle pattern: 0xFF
    Octet aligned: Disabled
```

```
    Jitter buffer: packets: 8, latency: 7 ms, auto adjust: Disabled
    Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  SONET alarms    : None
  SONET defects   : AIS-V, RDI-V
  SONET vt:
    BIP-BIP2                    0           0
    REI-V                       0           0
    LOP-V                       0           0  OK
    AIS-V                       2           0  Defect Active
    RDI-V                       2           0  Defect Active
    UNEQ-V                      0           0  OK
    PLM-V                       0           0  OK
    ES-V                        0
    SES-V                       0
    UAS-V                       2
    ES-VFE                      0
    SES-VFE                     0
    UAS-VFE                     0
  Received SONET overhead:
V5      : 0x07
V5(cmp) : 0x02
  Transmitted SONET overhead:
V5      : 0x02
  Packet Forwarding Engine configuration:
    Destination slot: 1
  CoS information:
    Direction : Output
    CoS transmit queue              Bandwidth              Buffer Priority
Limit
                              %           bps     %           usec
    0 best-effort            95       1459200    95              0      low
none
    3 network-control         5         76800     5              0      low
none

  Logical interface t1-1/0/0:1:1.0 (Index 69) (SNMP ifIndex 580) (Generation 525)

    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-SATOP
  CE info               Packets        Bytes  Count
    CE Tx                  1005       192960
    CE Rx                  1004       192768
    CE Rx Forwarded                       0
    CE Strayed                0
    CE Lost                   0
    CE Malformed              0
    CE Misinserted            0
    CE AIS dropped            0
    CE Dropped             1005       192960
    CE Overrun Events                      0
    CE Underrun Events                     0
    Protocol ccc, MTU: 1504, Generation: 814, Route table: 0
      Flags: Is-Primary
```

show interfaces extensive (DS, TDM-CCC-CESoPSN)

```
user@host>show interfaces ds-1/0/0:1:1:1 extensive
Physical interface: ds-1/0/0:1:1:1, Enabled, Physical link is Down
  Interface index: 154, SNMP ifIndex: 597, Generation: 819
```


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```
  Link-level type: TDM-CCC-CESoPSN, MTU: 1504, Speed: 1536kbps, Loopback: None,
FCS: 16, Parent: ct1-1/0/0:1:1 Interface index 153
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2012-10-29 00:49:03 PDT (00:00:35 ago)
  Statistics last cleared: Never
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                    0                    0

    1 expedited-fo                  0                    0                    0

    2 assured-forw                  0                    0                    0

    3 network-cont                  0                    0                    0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  CESoPSN configuration:
    Packetization latency: 1000 us
    Idle pattern: 0xFF
    Jitter buffer: packets: 8, latency: 8 ms, auto adjust: Disabled
    Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 1
  CoS information:
    Direction : Output
    CoS transmit queue              Bandwidth              Buffer Priority
Limit
                                %           bps     %           usec
    0 best-effort              95       1459200    95              0      low
none
    3 network-control           5         76800     5              0      low
none

  Logical interface ds-1/0/0:1:1:1.0 (Index 69) (SNMP ifIndex 598) (Generation
549)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-CESoPSN
  CE info               Packets        Bytes  Count
    CE Tx                     0            0
    CE Rx                 35712        6856704
    CE Rx Forwarded                        0
    CE Strayed                0
    CE Lost                   0
    CE Malformed              0
    CE Misinserted            0
    CE AIS dropped            0
    CE Dropped                0            0
    CE Overrun Events                         0
    CE Underrun Events                        1
```

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```
    Protocol ccc, MTU: 1504, Generation: 857, Route table: 0
      Flags: Is-Primary
```


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show interfaces (Channelized E1)

Syntax show interfaces ds-*fpc/pic/port:ds0channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information the specified channelized E1 interface.

Options

ds-*fpc/pic/port:ds0channel*—Display standard information about the specified channelized E1 interface.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output show interfaces extensive (Channelized E1) on page 613

Output Fields Table 42 on page 495 lists the output fields for the **show interfaces** (Channelized E1 and Channelized E1 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

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Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used on the link. It can be **G704**, **G704-NO-CRC4**, or **Unframed**. The default is **G704**.	All levels
Parent	(Channelized E1 IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **Interval *seconds***—Time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **Down-count *number***—Number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **Up-count *number***—Number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	(PPP and HDLC) Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  ◦ (**last seen 00:00:00 ago**)—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  ◦ (**last seen 00:00:00 ago**)—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

LMI settings	(Frame Relay) Settings for link management can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx*** seconds, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) Statistics about the link management. • **Input**—Number of packets coming in on the interface (*nn*) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)** • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh:mm:ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for**n392dte** or **n393dce** intervals. (See **LMI settings**).	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay, displayed only from the DTE) Number of DLCIs configured from the DCE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none
CoS Queues	Number of CoS queues configured.	**detail extensive** none
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output Rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**

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Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Traffic statistics	Number of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Giants**—Number of frames received that are larger than the giant threshold. • **Runts**—Number of frames received that are smaller than the runt threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), then either the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets larger than the MTU threshold. • **Resource errors**—Sum of transmit drops.	**extensive**
DS1 alarms **DS1 defects**	E1 media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see *Bellcore Telcordia GR-499-CORE*. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
E1 media	Active alarms and defects, plus counts of specific E1 errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than OK indicates a problem. The E1 media-specific error types can be: • **SEF**—Severely errored framing • **BEE**—Bit error • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **YELLOW**—Errors at the remote site receiver • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CS**—Carrier state • **FEBE**—Far-end block error • **LES**—Line error seconds • **ES**—Errored seconds • **BES**—Bursty errored seconds • **SES**—Severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Line encodingHDB3**—Line encoding used.	**extensive**
Interface transmit queues	Names of the transmit queues and their associated statistics for each DS0 channel on the Channelized E1 to DS0 PIC. • **B/W**—Queue bandwidth as a percentage of the total interface bandwidth. • **WRR**—Weighted round robin (in percent). • **Packets**—Number of packets transmitted. • **Bytes**—Number of bytes transmitted. • **Drops**—Number of packets dropped. • **Errors**—Number of packet errors.	**extensive**

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Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS*x* BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified

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Table 48: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Traffic statistics	Number and rate of bytes and packets received and transmitted on the logical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than one second) for this counter to stabilize.	**detail extensive**
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, **mpls**.	**detail extensive** none
Multilink bundle	(Multilink) Interface name for the multilink bundle, if configured.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces extensive (Channelized E1)

```
user@host> show interfaces ds-0/1/1:1 extensive
```

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```
Physical interface: ds-0/1/1:1, Enabled, Physical link is Down
  Interface index: 163, SNMP ifIndex: 37, Generation: 46
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : 2005-12-28 14:44:06 PST (00:00:30 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
     Resource errors: 0
  DS1   alarms   : LOF, LOS
  DS1   defects  : LOF, LOS
  E1  media:            Seconds        Count  State
    SEF                  982318            1  Defect Active
    BEE                       0            0  OK
    AIS                       0            0  OK
    LOF                  982318            1  Defect Active
    LOS                  982318            1  Defect Active
    YELLOW                    0            0  OK
    BPV                       1            1
    EXZ                       1            1
    LCV                       1            1
    PCV                       1            2
    CS                        0            0
    FEBE                      1            9
    LES                       1
    ES                   982318
    SES                  982318
    SEFS                 982318
    BES                       1
    UAS                       0
  Interface transmit queues:
              B/W  WRR       Packets        Bytes        Drops       Errors
    Queue0     95   95             0            0            0            0
    Queue1      5    5             0            0            0            0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 3
    Timeslots      : 31
    Line encoding: HDB3, Data inversion: Disabled, Idle cycle flag: flags,
    Start end flag: shared
  DS1 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^11 - 1, O.152 and O.153 (2047 type),
     Pseudorandom (8)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 2 (0x1b)
  CoS information:
    CoS transmit queue     Bandwidth        Buffer   Priority   Limit
```

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```
                     %         bps     %   usec
0 best-effort       95     1945600    95      0          low    none
3 network-control    5      102400     5      0          low    none
```

show interfaces (Channelized E1 IQ)

Syntax show interfaces (ce1-*fpc/pic/port* | *type-fpc/pic/port*<:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information about the specified channelized E1 IQ interface.

Options ***type-fpc/pic/port*:<*channel*>**—Interface type with optional corresponding channel levels. For the physical channelized E1 IQ interface, ***type*** is **ce**. For the clear channel, ***type*** is **e1**. At the first level of channelization, ***type*** is **ds**.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output
show interfaces (Channelized E1 IQ) (Physical) on page 616
show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation) on page 617
show interfaces extensive (Channelized E1 IQ MLFR Encapsulation) on page 618
show interfaces detail (Clear Channel E1) on page 619

Output Fields For information about output fields, see the output field table for the show interfaces (Channelized E1) command. Output fields are listed in the approximate order in which they appear.

Sample Output

show interfaces (Channelized E1 IQ) (Physical)

```
user@host> show interfaces ce1-1/2/3
Physical interface: ce1-1/2/3, Enabled, Physical link is Up
  Interface index: 18, SNMP ifIndex: 1128
  Link-level type: Frame-relay, Controller, MTU: 1504, Clocking: Internal,   Speed:
 E1, Loopback: None, FCS: 16, Framing: G704, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
```

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```
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                     : 43186
    Full enquiries sent                : 8515
    Enquiry responses received         : 43185
    Full enquiry responses received    : 8515
  DCE statistics:
    Enquiries received                 : 0
    Full enquiries received            : 0
    Enquiry responses sent             : 0
    Full enquiry responses sent        : 0
  Common statistics:
    Unknown messages received          : 0
    Asynchronous updates received      : 0
    Out-of-sequence packets received   : 0
    Keepalive responses timedout       : 0
  Nonmatching DCE-end DLCIs:
          2
  Last flapped   : 2002-10-04 17:52:51 PDT (00:32:57 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None
```

show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation)

```
user@host> show interfaces ds-0/3/4:1 extensive
Physical interface: ds-0/3/4:1, Enabled, Physical link is Up
  Interface index: 151, SNMP ifIndex: 63, Generation: 34
  Link-level type: Multilink-PPP, MTU: 1518, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16,
  Parent: ce1-0/3/4 Interface index 150
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  CHAP state: Closed
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : Never
  Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :             6070570                 224 bps
   Input  packets:                   0                   0 pps
   Output packets:              209330                   0 pps
  Input errors:
    Errors: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
     Resource errors: 0
  HDLC configuration:
    Giant threshold: 1528, Runt threshold: 2
    Timeslots      : 1
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
```

```
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)

  Logical interface ds-0/3/4:1.0 (Index 74) (SNMP ifIndex 64) (Generation 13)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol mlppp, Multilink bundle: ls-0/1/0.0, MTU: 1514, Generation: 24,
    Route table: 0
```

show interfaces extensive (Channelized E1 IQ MLFR Encapsulation)

```
user@host> show interfaces ds-0/3/4:5 extensive
Physical interface: ds-0/3/4:5, Enabled, Physical link is Up
  Interface index: 155, SNMP ifIndex: 72, Generation: 38
  Link-level type: Multilink-FR, MTU: 1518, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16,
  Parent: ce1-0/3/4 Interface index 150
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : No-Keepalives DCE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n392dce 3, n393dce 4, t392dce 15 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  DTE statistics:
    Enquiries sent                      : 0
    Full enquiries sent                 : 0
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
    Keepalive responses timedout        : 0
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : 2005-12-21 09:59:01 PST (1w0d 03:44 ago)
  Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
  Input errors:
    Errors: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
     Resource errors: 0
  HDLC configuration:
    Giant threshold: 1528, Runt threshold: 2
    Timeslots      : 5
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
```


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```
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x01)

  Logical interface ds-0/3/4:5.0 (Index 78) (SNMP ifIndex 73) (Generation 17)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                   0 bps
     Output bytes  :                   0                   0 bps
     Input  packets:                   0                   0 pps
     Output packets:                   0                   0 pps
    Protocol mlfr, Multilink bundle: ls-0/1/0.1, MTU: 1514, Generation: 28, Route
 table: 0
    DLCI 10
      Flags: Active
      Total down time: 0 sec, Last down: Never
      Traffic statistics:
       Input  bytes  :                 0
       Output bytes  :                 0
       Input  packets:                 0
       Output packets:                 0
  DLCI statistics:
    Active DLCI  :1  Inactive DLCI  :0
```

show interfaces detail (Clear Channel E1)

```
user@host> show interfaces e1-1/2/6 detail
Physical interface: e1-1/2/6, Enabled, Physical link is Up
  Interface index: 89, SNMP ifIndex: 1278, Generation: 341
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1, Loopback:None,
...
  Logical interface e1-1/2/6.0 (Index 52) (SNMP ifIndex 1279) (Generation 169)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
...
```

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show interfaces (Channelized T1 IQ)

Syntax show interfaces (ct1-*fpc/pic/port* | *type-fpc/pic/port*<:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced in Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information about the specified channelized T1 IQ interface.

Options ***type-fpc/pic/port*:*channel***—Interface type. With optional corresponding channel levels, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized T1 IQ interface, ***type*** is **ct1.**
- ***type-fpc/pic/port*:*channel***—For the clear channel, ***type*** is **t1**. At the first level of channelization, ***type*** can be **ct1** or **t1.**
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ds**.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output
show interfaces extensive (CT1) on page 628
show interfaces extensive (T1) on page 629
show interfaces extensive (DS0) on page 630

Output Fields Table 45 on page 551 lists the output fields for the **show interfaces** (Channelized T1 IQ and T3 IQ interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels

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Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used on the link. It can be **ESF** or **SF**. The default is **ESF**.	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	Configured settings for keepalives. • **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

LMI settings	(Frame Relay) Settings for Local Management Interface (LMI) can be either **ANSI LMI settings** or **ITU LMI settings**. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx seconds***, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) LMI packet statistics: • **Input**—Number of packets coming in on the interface (***nn***) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)**. • **Output**—Number of packets sent out on the interface (***nn***) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh:mm:ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communication equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the**Success** state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none

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Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS queues	Number of CoS queues configured.	**detail extensive** none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface. • **Input packets, Output packets**—Number of packets received and transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Giants**—Number of frames received that are larger than the giant threshold. • **Runts**—Number of frames received that are smaller than the runt threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Counter increments when the software could not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets whose size exceeds the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
DS1 alarms DS1 defects	Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
T1 media	Counts of T1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 media-specific error types can be: • **AIS**—Alarm indication signal • **BEE**—Bit error event • **BES**—Bit error seconds • **BPV**—Bipolar violation • **CS**—Carrier state • **ES**—Errored seconds • **EXZ**—Excessive zeros • **FEBE**—Far-end block error • **LCV**—Line code violation • **LES**—Line error seconds • **LOF**—Loss of frame • **LOS**—Loss of signal • **PCV**—Pulse code violation • **SEF**—Severely errored framing • **SEFS**—Severely errored framing seconds (section) • **SES**—Severely errored seconds • **UAS**—Unavailable seconds • **YELLOW**—Errors at the remote site receiver	**extensive**
Line encoding	Line encoding used: **B8ZS** or **AMI**.	All levels
Buildout	Buildout setting.	All levels
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Line encoding**—Line encoding used: **B8ZS** or **AMI**. • **Byte encoding**—Byte encoding used: **Nx64K** or **Nx56K**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**. • **Idle cycle Flag**—Idle cycle flags. • **Start end Flag**—Start and end flag.	**extensive**

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Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS0 or DS1 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface; values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	**All levels**
Encapsulation	Encapsulation on the logical interface.	**All levels**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, or **mpls**.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none

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Table 49: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces extensive (CT1)

```
user@host> show interfaces extensive ct1-0/1/1
Physical interface: ct1-0/1/1, Enabled, Physical link is Up
   Interface index: 145, SNMP ifIndex: 32, Generation: 28
   Link-level type: Controller, Clocking: Internal, Speed: T1,
   Loopback: None, Framing: ESF, Parent: None
 Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps 16384
   Link flags     : None
   Hold-times     : Up 0 ms, Down 0 ms
   CoS queues     : 4 supported
   Last flapped   : 2005-08-17 11:47:09 PDT (1d 03:38 ago)
   Statistics last cleared: 2005-08-18 15:25:37 PDT (00:00:27 ago)
   DS1   alarms   : None
   DS1   defects  : None
   T1  media:            Seconds        Count  State
     SEF                       0            0  OK
     BEE                       0            0  OK
     AIS                       0            0  OK
     LOF                       0            0  OK
     LOS                       0            0  OK
     YELLOW                    0            0  OK
     BPV                       0            0
     EXZ                       0            0
     LCV                       0            0
     PCV                       0            0
     CS                        0            0
     LES                       0
     ES                        0
     SES                       0
     SEFS                      0
     BES                       0
```


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```
    UAS                      0
    Line encoding: B8ZS
    Buildout       : 0 to 132 feet
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
```

show interfaces extensive (T1)

```
user@host> show interfaces extensive t1-0/2/0
Physical interface: t1-0/2/0, Enabled, Physical link is Up
   Interface index: 161, SNMP ifIndex: 33, Generation: 61
   Link-level type: PPP, MTU: 1504, Speed: T1, Loopback: None, FCS: 16,
   Parent: ct1-0/2/0 Interface index 148
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps 16384
   Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
   Hold-times     : Up 0 ms, Down 0 ms
   CoS queues     : 4 supported
   Last flapped   : 2005-09-07 15:43:47 PDT (00:00:06 ago)
   Statistics last cleared: Never
   Traffic statistics:
    Input  bytes  :                   0                   0 bps
    Output bytes  :                  14                   0 bps
    Input  packets:                   0                   0 pps
    Output packets:                   1                   0 pps
   Input errors:
     Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
     Policed discards: 0, L3 incompletes: 0,
     L2 channel errors: 0, L2 mismatch timeouts: 0,
     HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
   Output errors:
     Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0,
     MTU errors: 0, Resource errors: 0
   Queue counters:       Queued packets  Transmitted packets Dropped packets
     0 best-effort                    0                   0               0
     1 expedited-fo                   0                   0               0
     2 assured-forw                   0                   0               0
     3 network-cont                   1                   1               0
   DS1   alarms   : None
```

```
  DS1   defects  : None
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 1514, Runt threshold: 2
    Timeslots      : All active
    Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag:
    flags, Start end flag: shared
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)
```

show interfaces extensive (DS0)

```
user@host> show interfaces extensive ds-0/1/0:0
Physical interface: ds-0/1/0:1, Enabled, Physical link is Up
   Interface index: 157, SNMP ifIndex: 52, Generation: 46
   Link-level type: Frame-Relay, PPP, MTU: 1504, Clocking: Internal,
   Speed: 640kbps, Loopback: None, FCS:16,
   Parent: ct1-0/1/0 Interface index 143
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps 16384
   Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                     : 43186
    Full enquiries sent                : 8515
    Enquiry responses received         : 43185
    Full enquiry responses received    : 8515
  DCE statistics:
    Enquiries received                 : 0
    Full enquiries received            : 0
    Enquiry responses sent             : 0
    Full enquiry responses sent        : 0
  Common statistics:
    Unknown messages received          : 0
    Asynchronous updates received      : 0
    Out-of-sequence packets received   : 0
    Keepalive responses timedout       : 0
  Nonmatching DCE-end DLCIs:
          2
   Hold-times     : Up 0 ms, Down 0 ms
   Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
   Keepalive statistics:
     Input : 8 (last seen 00:00:12 ago)
     Output: 8 (last sent 00:00:07 ago)
   LCP state: Opened
   NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
   mpls: Not-configured
   CHAP state: Not-configured
   CoS queues     : 4 supported
   Last flapped   : 2005-08-18 15:23:46 PDT (00:03:17 ago)
   Statistics last cleared: 2005-08-18 15:25:37 PDT (00:01:26 ago)
   Traffic statistics:
    Input  bytes  :                  840                    0 bps
    Output bytes  :                  912                    0 bps
    Input  packets:                   25                    0 pps
    Output packets:                   26                    0 pps
   Input errors:
     Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
     Policed discards: 0, L3 incompletes: 0,
```


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```
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0,
    MTU errors: 0, Resource errors: 0
  Queue counters:       Queued packets  Transmitted packets Dropped packets
    0 best-effort                    0                    0               0
    1 expedited-fo                   0                    0               0
    2 assured-forw                   0                    0               0
    3 network-cont                  26                   26               0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 2
    Timeslots      : 1-10
    Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
    Start end flag: shared
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)
Logical interface ds-0/1/0:1.0 (Index 67) (SNMP ifIndex 53) (Generation 11)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 26, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 11.11.11.0/30, Local: 11.11.11.2, Broadcast: 11.11.11.3,
        Generation: 39
   DLCI 100
     Flags: Active, Dce-configured
     Total down time: 0 sec, Last down: Never
     Traffic statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
 DLCI statistics:
   Active DLCI  :2 Inactive DLCI  : 0
...
```

show interfaces (T1, E1, or DS)

Syntax

show interfaces *interface-type*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

Display status information about the specified T1, E1, or DS interface.

Options

interface-type—On ACX Series, M Series, MX Series, and T Series routers, the T1 interface type is **t1-*fpc/pic/port***, whereas the E1 interface type is **e1-*fpc/pic/port***, and DS interface type is **ds-*fpc/pic/port*:<channel>**. On the J Series routers, the T1 interface type is **t1-*pim*/0/*port***, whereas the E1 interface type is **e1-*pim*/0/*port***.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

Related Documentation

- *Understanding Interfaces on ACX Series Universal Access Routers*

List of Sample Output

show interfaces (T1, IMA Link) on page 644
show interfaces (T1, PPP) on page 645
show interfaces detail (T1, PPP) on page 645
show interfaces extensive (T1 CRC Errors) on page 646
show interfaces extensive (T1, PPP) on page 646
show interfaces (E1, Frame Relay) on page 648
show interfaces detail (E1, Frame Relay) on page 649
show interfaces extensive (E1, Frame Relay) on page 650
show interfaces (E1, IMA Link) on page 652
show interfaces extensive (T1, TDM-CCC-SATOP) on page 653
show interfaces extensive (DS, TDM-CCC-CESoPSN) on page 654

Output Fields

Table 47 on page 581 lists the output fields for the **show interfaces** (T1 or E1) command. Output fields are listed in the approximate order in which they appear.

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Table 50: T1 or E1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used for the E1 interface on the link: **G704**, **G704-NO-CRC4**, or **Unframed**. The default is **G704**. Physical layer framing format used for the T1 interface on the link: **SF** and **ESF**. The default is **ESF**.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**

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Table 50: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
IMA Link alarms	Current active IMA link alarms, including the following: • **LIF** • **LODS** • **RFI-IMA** • **Tx-Mis-Connected** • **Tx-Unusable-FE** • **Rx-Unusable-FE** • **Link Fault**	**detail extensive** none
IMA Link defects	Current active IMA link defects, including the following: • **LIF** • **LODS** • **RFI-IMA** • **Tx-Mis-Connected** • **Tx-Unusable-FE** • **Rx-Unusable-FE** • **Link Fault**	**detail extensive** none

IMA Link state	Current active IMA link status, including the following:
	• **Line:** synchronized or not synchronized
	• **Near end:**—Status of near-end receive and transmit links
	  ◦ **Rx:** Usable or Unusable
	  ◦ **Tx:** Usable or Unusable
	• **Far end:**—Status of far-end receive and transmit links
	  ◦ **Rx:** Usable or Unusable
	  ◦ **Tx:** Usable or Unusable
		detail extensive none

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Table 50: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
IMA link media	IMA Link Media Status, which provides the seconds and count state for the following link media parameters: • LIF • LODS • Err-ICP • IV • Rx-FC • Tx-FC • FE-Defects • FE-Rx-FC • FE-Tx-FC • Rx-ICP • Rx-Stuff • Tx-ICP • Tx-Stuff • Rx-SES • Rx-UAS • Rx-UUS • Tx-UUS • FE-Rx-SES • FE-Rx-UAS • FE-Rx-UUS • FE-Tx-UUS	**detail extensive** none
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

Keepalive statistics	(PPP and HDLC) Information about keepalive packets. (When no level of output is specified, the word **statistics** is not part of the field name and the **last seen** text is not displayed.)
	• **Input**—Number of keepalive packets received by PPP.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

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Table 50: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
LMI settings	(Frame Relay) Settings for Local Management Interface (LMI) which can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx*** seconds, where *value* can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) Local Management Interface (LMI) packet statistics: • **Input**—Number of packets coming in on the interface (***nn***) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh*:*mm*:*ss* ago)**. • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh*:*mm*:*ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communications equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 50: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no Local Management Interface (LMI) packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE.) Number of DLCIs configured from the DCE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) State of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response is not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Down**—CHAP authentication is incomplete (not yet completed or has failed). • **Not-configured**—CHAP is not configured on the interface. • **Opened**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago).**	**detail extensive** none

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Table 50: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS Queues	Number of CoS queues configured.	**detail extensive** none
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC or PIM. If the value of this field increments, the PIC or PIM is malfunctioning. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 50: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
DS1 alarms **DS1 defects**	E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see *Bellcore Telcordia GR-499-CORE*. • **AIS**—Alarm indication signal. • **LOF**—Loss of frame. • **LOS**—Loss of signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 50: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
T1 media or **E1 media**	Counts of T1 or E1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 or E1 media-specific error types are: • **SEF**—Severely errored framing • **BEE**—Bit error • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **YELLOW**—Errors at the remote site receiver • **CRC Major**—Cyclic redundancy check major alarm threshold exceeded • **CRC Minor**—Cyclic redundancy check minor alarm threshold exceeded • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CS**—Carrier state • **CRC**—Cyclic redundancy check • **FEBE**—Far-end block error (E1 only) • **LES**—Line error seconds • **ES**—Errored seconds • **BES**—Bursty errored seconds • **SES**—Severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
SAToP Configuration	Information about the SAToP configuration. • **payload-size**—Configure the payload size, in bytes (from 32 through 1024 bytes). • **idle-pattern**—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • **jitter-buffer-packets**—Number of packets in the jitter buffer (from 1 through 64 packets). • **jitter-buffer-latency**—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • **excessive-packet-loss-rate**—Set packet loss options. The options are **groups**, **sample-period**, and **threshold**. • **sample-period**—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • **threshold**—Percentile designating the threshold of excessive packet loss rate (1–100 percent).	**extensive**

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Table 50: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CESoPSN Configuration	Information about the CESoPSN configuration. • **packetization-latency**—Time required to create packets (from 1000 through 8000 microseconds). • **idle-pattern**—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • **jitter-buffer-packets**—Number of packets in the jitter buffer (from 1 through 64 packets). • **jitter-buffer-latency**—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • **excessive-packet-loss-rate**—Set packet loss options. The options are **sample-period** and **threshold**. • **sample-period**—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • **threshold**—Percentile designating the threshold of excessive packet loss rate (1–100 percent).	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Time slots configured on the interface. • **Buildout**—(T1 only) Buildout setting: 0-132, 133-265, 266-398, 399-531, or 532-655 feet. • **Timeslots**—Configured time slots for the interface. • **Byte encoding**—(T1 only) Byte encoding used: **Nx64K** or **Nx56K**. • **Line encoding**—Line encoding used. For T1, the value can be **B8ZS** or **AMI**. For E1, the value is **HDB3**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**. • **Idle cycle flag**—Idle cycle flags. • **Start end flag**—Start and end flag.	**extensive**
DS1 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**

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Table 50: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes a while (generally, less than 1 second) for this counter to stabilize.	**detail extensive**

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Table 50: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter normally stabilizes in less than 1 second.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, **mlfr**, or **mpls**.	**detail extensive** none
Multilink bundle	Interface name for the multilink bundle, if configured.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive** none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics** or (**Input packets, Output packets**). **Flags** can be one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **DCE-Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **DCE-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

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Table 50: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CE Info	Information related to the circuit emulation statistics. • **CE Tx**—Number of transmitted packets and bytes (TDM to PSN flow). • **CE Rx**—Number of received packets and bytes and forward bytes (PSN to TDM flow). • **CE Rx Forwarded**—Number of forwarded bytes. • **CE Strayed**—Number of stray packets. • **CE Lost**—Number of lost packets. • **CE Malformed**—Number of malformed packets • **CE Misinserted**—Number of misinserted packets. • **CE AIS dropped**—Number of dropped bytes due to buffer overrun (PSN to TDM). • **CE Dropped**—Number of dropped packets during resynchronization • **CE Overrun Events**—Number of overrun events. • **CE Underrun Events**—Number of underrun events.	**extensive**

Sample Output

show interfaces (T1, IMA Link)

```
user@host> show interfaces t1-1/0/0
  IMA Link alarms   : None
  IMA Link defects  : LIF, LODS
  IMA Link state:
    Line     : Not synchronized
    Near end : Rx: Unusable, Tx: Usable
    Far  end : Rx: Unusable, Tx: Usable
  IMA link media:          Seconds        Count  State
    LIF                                       0  OK
    LODS                                      0  OK
    Err-ICP                                   0  OK
    IV                                        0  OK
    Rx-FC                                     0  OK
    Tx-FC                                     0  OK
    FE-Defects                                0
    FE-Rx-FC                                  0
    FE-Tx-FC                                  0
    Rx-ICP                                    0
    Rx-Stuff                                  0
    Tx-ICP                                   11
    Tx-Stuff                                  0
    Rx-SES                    0
    Rx-UAS                    0
    Rx-UUS                    1
    Tx-UUS                    0
    FE-Rx-SES                 0
    FE-Rx-UAS                 0
    FE-Rx-UUS                 0
    FE-Tx-UUS                 0
```


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show interfaces (T1, PPP)

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:35 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 72 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None

  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255
```

show interfaces detail (T1, PPP)

```
user@host> show interfaces t1-1/1/0 detail
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:52 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                  798                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                   42                    0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0
```

```
    2 assured-forw                 0                  0                  0

    3 network-cont                40                 40                  0

  DS1   alarms   : None
  DS1   defects  : None
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1
  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 14, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 18
```

show interfaces extensive (T1 CRC Errors)

```
user@host> show interfaces t1-3/2/0:1:1 extensive
Physical interface: t1-3/2/0:1:1, Enabled, Physical link is Down
  Interface index: 179, SNMP ifIndex: 79, Generation: 180
  :
  :
  DS1   alarms   : AIS, LOF, CRC Major, CRC Minor
  DS1   defects  : AIS, LOF, CRC Major, CRC Minor
  T1  media:            Seconds        Count  State
    SEF                       1            1  OK
    BEE                       1            1  OK
    AIS                    1128            1  Defect Active
    LOF                    1128            1  Defect Active
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    CRC Major               154            1  Defect Active
    CRC Minor               154            1  Defect Active
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CS                        0            0
    CRC                     154        15400
    ...
```

show interfaces extensive (T1, PPP)

```
user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
```


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```
CHAP state: Closed
CoS queues     : 4 supported, 4 in use
Last flapped   : 2005-12-05 08:43:06 PST (02:13:54 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                   0                   0 bps
 Output bytes  :                 817                  72 bps
 Input  packets:                   0                   0 pps
 Output packets:                  43                   0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

  Resource errors: 0
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort                   0                   0                   0

  1 expedited-fo                  0                   0                   0

  2 assured-forw                  0                   0                   0

  3 network-cont                 42                  42                   0

DS1   alarms   : None
DS1   defects  : None
T1  media:            Seconds        Count  State
  SEF                       1            1  OK
  BEE                       0            0  OK
  AIS                       0            0  OK
  LOF                       1            1  OK
  LOS                       0            0  OK
  YELLOW                    1            1  OK
  BPV                       1            1
  EXZ                       1            1
  LCV                       1        65535
  PCV                       1         1023
  CS                        0            0
  LES                       1
  ES                        1
  SES                       1
  SEFS                      1
  BES                       0
  UAS                       0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : All active
  Line encoding: B8ZS
  Buildout       : 0 to 132 feet
  Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
  Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1
Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 1 (0x00)
```

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```
  CoS information:
    CoS transmit queue       Bandwidth          Buffer   Priority    Limit
                          %          bps     %     usec
    0 best-effort        95      1459200    95        0        low    none
    3 network-control     5        76800     5        0        low    none

  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 14, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 18
```

show interfaces (E1, Frame Relay)

```
user@host> show interfaces e1-3/0/0
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 0 (never), Output: 11 (00:00:05 ago)
  DTE statistics:
    Enquiries sent                      : 10
    Full enquiries sent                 : 1
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
    Keepalive responses timedout        : 1
  CoS queues     : 8 supported
  Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None
  Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Input packets : 0
  Output packets: 0
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255
    DLCI 100
      Flags: Down, DCE-Unconfigured
      Total down time: 00:01:13 sec, Last down: 00:01:13 ago
      Input packets : 0
      Output packets: 0
```


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```
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces detail (E1, Frame Relay)

```
user@host> show interfaces e1-3/0/0 detail
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37, Generation: 69
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 12 (last sent 00:00:02 ago)
  DTE statistics:
    Enquiries sent                      : 10
    Full enquiries sent                 : 2
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
    Keepalive responses timedout        : 1
  CoS queues     : 8 supported
  Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                 225                  56 bps
   Input  packets:                   0                   0 pps
   Output packets:                  15                   0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 limited                       0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 real-plus                     0                   0                   0

    3 network-cont                 15                  15                   0

  DS1   alarms   : None
  DS1   defects  : None
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
```

```
    Input  packets:                    0
    Output packets:                    0
  Local statistics:
    Input  bytes  :                    0
    Output bytes  :                    0
    Input  packets:                    0
    Output packets:                    0
  Transit statistics:
    Input  bytes  :                    0                    0 bps
    Output bytes  :                    0                    0 bps
    Input  packets:                    0                    0 pps
    Output packets:                    0                    0 pps
  Protocol inet, MTU: 1500, Generation: 32, Route table: 0
    Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
      Generation: 42
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:01:18 sec, Last down: 00:01:18 ago
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
DLCI statistics:
  Active DLCI  :0  Inactive DLCI  :1
```

show interfaces extensive (E1, Frame Relay)

```
user@host> show interfaces e1-3/0/0 extensive
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37, Generation: 69
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 12 (last sent 00:00:05 ago)
  DTE statistics:
    Enquiries sent                     : 10
    Full enquiries sent                : 2
    Enquiry responses received         : 0
    Full enquiry responses received    : 0
  DCE statistics:
    Enquiries received                 : 0
    Full enquiries received            : 0
    Enquiry responses sent             : 0
    Full enquiry responses sent        : 0
  Common statistics:
    Unknown messages received          : 0
    Asynchronous updates received      : 0
    Out-of-sequence packets received   : 0
    Keepalive responses timedout       : 1
  CoS queues     : 8 supported
  Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Statistics last cleared: Never
```


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```
Traffic statistics:
 Input  bytes  :                    0                    0 bps
 Output bytes  :                  225                    0 bps
 Input  packets:                    0                    0 pps
 Output packets:                   15                    0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 17, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 limited                        0                    0                    0

  1 expedited-fo                   0                    0                    0

  2 real-plus                      0                    0                    0

  3 network-cont                  15                   15                    0

DS1   alarms   : None
DS1   defects  : None
E1  media:            Seconds        Count  State
  SEF                       0            0  OK
  BEE                       5            5  OK
  AIS                       0            0  OK
  LOF                     245           15  OK
  LOS                     245            4  OK
  YELLOW                    0           11  OK
  BPV                       0            0
  EXZ                       9            9
  LCV                       0            0
  PCV                       0            0
  CS                        0            0
  FEBE                      0            0
  LES                       0
  ES                        0
  SES                       0
  SEFS                      0
  BES                       0
  UAS                     271
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1506, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3, Data inversion: Disabled, Idle cycle flag: flags,
  Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 3, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue       Bandwidth          Buffer   Priority    Limit
                         %          bps     %     usec
  0 limited             95      1945600    95        0        low     none
  3 network-control      5       102400     5        0        low     none
Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
```

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```
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                  0 bps
     Output bytes  :                   0                  0 bps
     Input  packets:                   0                  0 pps
     Output packets:                   0                  0 pps
    Protocol inet, MTU: 1500, Generation: 32, Route table: 0
      Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
        Generation: 42
    DLCI 100
      Flags: Down, DCE-Unconfigured
      Total down time: 00:01:21 sec, Last down: 00:01:21 ago
      Traffic statistics:
       Input  bytes  :                  0
       Output bytes  :                  0
       Input  packets:                  0
       Output packets:                  0
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces (E1, IMA Link)

```
user@host> show interfaces e1-1/0/0
  IMA Link alarms   : None
  IMA Link defects  : LIF, LODS
  IMA Link state:
    Line     : Not synchronized
    Near end : Rx: Unusable, Tx: Usable
    Far  end : Rx: Unusable, Tx: Usable
  IMA link media:          Seconds        Count  State
    LIF                                       0
    LODS                                      0
    Err-ICP                                   0
    IV                                        0
    Rx-FC                                     0
    Tx-FC                                     0
    FE-Defects                                0
    FE-Rx-FC                                  0
    FE-Tx-FC                                  0
    Rx-ICP                                    0
    Rx-Stuff                                  0
    Tx-ICP                                   11
    Tx-Stuff                                  0
    Rx-SES                    0
    Rx-UAS                    0
    Rx-UUS                    1
    Tx-UUS                    0
    FE-Rx-SES                 0
    FE-Rx-UAS                 0
```


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```
    FE-Rx-UUS                   0
    FE-Tx-UUS                   0
```

show interfaces extensive (T1, TDM-CCC-SATOP)

```
user@host>show interfaces t1-1/0/0:1:1 extensive
Physical interface: t1-1/0/0:1:1, Enabled, Physical link is Down
  Interface index: 153, SNMP ifIndex: 579, Generation: 817
  Link-level type: TDM-CCC-SATOP, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-1/0/0:1 Interface index 152
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2012-10-28 02:12:40 PDT (22:32:13 ago)
  Statistics last cleared: 2012-10-29 00:44:52 PDT (00:00:01 ago)
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 assured-forw                  0                   0                   0

    3 network-cont                  0                   0                   0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  DS1   alarms   : None
  DS1   defects  : None
  T1  media:            Seconds        Count  State
    SEF                         0            0  OK
    BEE                         0            0  OK
    AIS                         0            0  OK
    LOF                         0            0  OK
    LOS                         0            0  OK
    YELLOW                      0            0  OK
    CRC Major                   0            0  OK
    CRC Minor                   0            0  OK
    BPV                         0            0
    EXZ                         0            0
    LCV                         0            0
    PCV                         0            0
    CS                          0            0
    CRC                         0            0
    LES                         0
    ES                          0
    SES                         0
    SEFS                        0
    BES                         0
    UAS                         0
  SAToP configuration:
    Payload size: 192
    Idle pattern: 0xFF
    Octet aligned: Disabled
```

```
    Jitter buffer: packets: 8, latency: 7 ms, auto adjust: Disabled
    Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  SONET alarms    : None
  SONET defects   : AIS-V, RDI-V
  SONET vt:
    BIP-BIP2                    0           0
    REI-V                       0           0
    LOP-V                       0           0  OK
    AIS-V                       2           0  Defect Active
    RDI-V                       2           0  Defect Active
    UNEQ-V                      0           0  OK
    PLM-V                       0           0  OK
    ES-V                        0
    SES-V                       0
    UAS-V                       2
    ES-VFE                      0
    SES-VFE                     0
    UAS-VFE                     0
  Received SONET overhead:
V5      : 0x07
V5(cmp) : 0x02
  Transmitted SONET overhead:
V5      : 0x02
  Packet Forwarding Engine configuration:
    Destination slot: 1
  CoS information:
    Direction : Output
    CoS transmit queue              Bandwidth              Buffer Priority
Limit
                              %           bps     %           usec
    0 best-effort            95       1459200    95              0      low
none
    3 network-control         5         76800     5              0      low
none

  Logical interface t1-1/0/0:1:1.0 (Index 69) (SNMP ifIndex 580) (Generation 525)

    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-SATOP
  CE info               Packets        Bytes  Count
    CE Tx                  1005       192960
    CE Rx                  1004       192768
    CE Rx Forwarded                       0
    CE Strayed                0
    CE Lost                   0
    CE Malformed              0
    CE Misinserted            0
    CE AIS dropped            0
    CE Dropped             1005       192960
    CE Overrun Events                      0
    CE Underrun Events                     0
    Protocol ccc, MTU: 1504, Generation: 814, Route table: 0
      Flags: Is-Primary
```

show interfaces extensive (DS, TDM-CCC-CESoPSN)

```
user@host>show interfaces ds-1/0/0:1:1:1 extensive
Physical interface: ds-1/0/0:1:1:1, Enabled, Physical link is Down
  Interface index: 154, SNMP ifIndex: 597, Generation: 819
```


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```
  Link-level type: TDM-CCC-CESoPSN, MTU: 1504, Speed: 1536kbps, Loopback: None,
FCS: 16, Parent: ct1-1/0/0:1:1 Interface index 153
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2012-10-29 00:49:03 PDT (00:00:35 ago)
  Statistics last cleared: Never
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 assured-forw                  0                   0                   0

    3 network-cont                  0                   0                   0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  CESoPSN configuration:
    Packetization latency: 1000 us
    Idle pattern: 0xFF
    Jitter buffer: packets: 8, latency: 8 ms, auto adjust: Disabled
    Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 1
  CoS information:
    Direction : Output
    CoS transmit queue              Bandwidth               Buffer Priority
Limit
                                %           bps     %           usec
    0 best-effort              95       1459200    95              0      low
none
    3 network-control           5         76800     5              0      low
none

  Logical interface ds-1/0/0:1:1:1.0 (Index 69) (SNMP ifIndex 598) (Generation
549)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-CESoPSN
  CE info               Packets        Bytes  Count
    CE Tx                     0            0
    CE Rx                 35712       6856704
    CE Rx Forwarded                        0
    CE Strayed                0
    CE Lost                   0
    CE Malformed              0
    CE Misinserted            0
    CE AIS dropped            0
    CE Dropped                0            0
    CE Overrun Events                      0
    CE Underrun Events                     1
```

```
    Protocol ccc, MTU: 1504, Generation: 857, Route table: 0
      Flags: Is-Primary
```


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show interfaces (Channelized OC12)

Syntax
show interfaces t3-*fpc/pic/port*:*t3channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information
Command introduced before Junos OS Release 7.4.

Description
Display status information about the specified channelized OC12 interface.

Options
t3-*fpc/pic/port*:*t3channel*—Display standard information about the specified channelized OC12 interface.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level
view

List of Sample Output
show interfaces extensive (Channelized OC12) on page 657

Output Fields
See the output field table for the show interfaces (Channelized OC3 IQ and IQE) command.

Sample Output

show interfaces extensive (Channelized OC12)

```
user@host> show interfaces t3-0/3/0:0 extensive
Physical interface: t3-0/3/0:0, Enabled, Physical link is Up
  Interface index: 32, SNMP ifIndex: 21, Generation: 2719
  Link-level type: Frame-Relay, PPP, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: T3, Loopback: None, SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
```

```
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
  Hold-times     : Up 0 ms, Down 0 ms
  Last flapped   : 2002-05-23 16:59:03 PDT (18:23:58 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                1700                    0 bps
   Output bytes  :                1714                    0 bps
   Input  packets:                 123                    0 pps
   Output packets:                 124                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 1100817, Bucket drops: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
  DS3   alarms   : None
  SONET alarms   : None
  DS3   defects  : None
  SONET defects  : None
  DS3 media:            Seconds        Count  State
    AIS                       0            0  OK
    LOF                      18            1  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                      36       122399
    CCV                      72        91948
    LES                       0
    PES                      18
    PSES                     18
    CES                      18
    CSES                     18
    SEFS                     18
    UAS                       0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 4484, Runt threshold: 3
  DSU configuration:
    Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
    FEAC loopback: Inactive, Response: Disabled, Count: 0
  DS3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: Unknown (0), Induced error rate: 10e-0
Interface transmit queues:
              B/W  WRR       Packets        Bytes        Drops       Errors
    Queue0     95   95             0            0            0            0
    Queue1      5    5           529         6348            0            0
```


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```
SONET PHY:            Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                20            1  OK
SONET section:
  BIP-B1                    0            0
  SEF                      20            1  OK
  LOS                      20            1  OK
  LOF                      20            1  OK
  ES-S                     20
  SES-S                    20
  SEFS-S                   20
SONET line:
  BIP-B2                    0            0
  REI-L                     0            0
  RDI-L                     0            0  OK
  AIS-L                     0            0  OK
  BERR-SF                  18            1  OK
  BERR-SD                   2            1  OK
  ES-L                     20
  SES-L                    20
  UAS-L                    10
  ES-LFE                    0
  SES-LFE                   0
  UAS-LFE                   0
SONET path:
  BIP-B3                    0            0
  REI-P                     0            0
  LOP-P                    20            1  OK
  AIS-P                     0            0  OK
  RDI-P                     0            0  OK
  UNEQ-P                    0            0  OK
  PLM-P                    20            1  OK
  ES-P                     20
  SES-P                    20
  UAS-P                    10
  ES-PFE                    0
  SES-PFE                   0
  UAS-PFE                   0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00, V5      : 0x00
  V5(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00, V5      : 0x00
Received path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 0d 0a   t3-0/3/0:0......
Transmitted path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 00 00   t3-0/3/0:0......
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue              Bandwidth           Buffer Priority   Limit
                             %          bps   %         usec
  0 best-effort             95     42499200  95            0      low    none
  3 network-control          5      2236800   5            0      low    none
Logical interface t3-0/3/0:0.0 (Index 11) (SNMP ifIndex 268) (Generation 499)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 4470, Generation: 578, Route table: 0
```

```
     Flags: None
     Addresses, Flags: Is-Preferred Is-Primary
       Destination: 22.22.22.1, Local: 22.22.22.2, Broadcast: Unspecified,
Generation: 98
DLCI 100
     Flags: Active, Dce-configured
     Total down time: 0 sec, Last down: Never
     Traffic statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
 DLCI statistics:
   Active DLCI  :2 Inactive DLCI  : 0
```


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show interfaces (Channelized OC12 IQ and IQE)

Syntax show interfaces (*type-fpc/pic/port*<:*channel*><:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description Display status information about the specified channelized OC12 IQ and IQE interface.

Options ***type-fpc/pic/port*:*channel*:*channel*:*channel***—Interface type with optional corresponding channel levels.

For SONET mode, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized OC12 IQ or IQE interface, ***type*** is **coc12**. For the clear channel, ***type*** is **so** (for OC12).
- ***type-fpc/pic/port*:*channel***—At the first level of channelization, ***type*** can be **coc1**(channelized OC1), **ct3** (from **coc1)**, **so** (for OC3), or **t3.**
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ct1** (from **ct3**or **coc1)** or **t1** (from **ct3** or **coc1)**.
- ***type-fpc/pic/port*:*channel*:*channel*:*channel***—At the third level of channelization, ***type*** is **ds** (from **ct1**).

For SDH mode, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized OC12 IQ or IQE interface, ***type*** is **cstm4**. For the clear channel, ***type*** is **so** (for SONET/SDH (vc-4-4c)).
- ***type-fpc/pic/port*:*channel***—At the first level of channelization,***type*** can be **so** (from **cstm4)** or **cau4** (from **cstm4)**.
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ct3**or **t3** (from or **cau4)**.
- ***type-fpc/pic/port*:*channel*:*channel*:*channel***—At the third level of channelization, ***type*** is **ct1** or **t1** (from **ct3**).
- ***type-fpc/pic/port*:*channel*:*channel*:*channel***—At the fourth level of channelization, ***type*** is **ds** (from **ct1**).

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

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statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output
show interfaces extensive (CAU4 on Channelized OC-12 IQ) on page 662
show interfaces extensive (Channelized OC1 on Channelized OC12 IQ) on page 662
show interfaces extensive (Channelized OC12 IQ) (Physical) on page 662
show interfaces extensive (Channelized T1 from Channelized OC12 IQ) on page 663
show interfaces extensive (Channelized T3 on Channelized OC12 IQ) on page 663
show interfaces extensive (CSTM4 on Channelized OC-12 IQ) on page 663
show interfaces extensive (DS0 on Channelized OC12 IQ) on page 663
show interfaces extensive (SONET Interface on Channelized OC12 IQ) on page 663
show interfaces extensive (T1 on Channelized OC12 IQ) on page 664

Output Fields See the output field table for the show interfaces (Channelized OC3 IQ and IQE) command.

Sample Output

show interfaces extensive (CAU4 on Channelized OC-12 IQ)

```
user@host> show interfaces cau4-0/2/0:1 extensive
Physical interface: cau4-0/2/0:1, Enabled, Physical link is Up
   Interface index: 219, SNMP ifIndex: 139, Generation: 221
   Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC3,
   Loopback: None, Parent: cstm4-0/2/0 Interface index 216
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : None
...
```

show interfaces extensive (Channelized OC1 on Channelized OC12 IQ)

```
user@host> show interfaces extensive coc1-4/2/0:7
Physical interface: coc1-4/2/0:7, Enabled, Physical link is Up
  Interface index: 381, SNMP ifIndex: 2524, Generation: 728
  Link-level type: Controller, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: 51840kbps, Loopback: None,
  FCS: 16, Payload scrambler: Disabled, Parent: coc12-4/2/0 (Index 266)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (Channelized OC12 IQ) (Physical)

```
user@host> show interfaces extensive coc12-4/2/0
Physical interface: coc12-4/2/0, Enabled, Physical link is Up
  Interface index: 266, SNMP ifIndex: 1269, Generation: 601
  Link-level type: Controller, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: OC12, Loopback: None,
  FCS: 16, Payload scrambler: Disabled, Parent: None  Device flags   : Present
Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
...
```


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show interfaces extensive (Channelized T1 from Channelized OC12 IQ)

```
user@host> show interfaces extensive ct1-4/2/0:7:1
Physical interface: ct1-4/2/0:4:1, Enabled, Physical link is Up
  Interface index: 305, SNMP ifIndex: 2410, Generation: 640
  Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16,
  Framing: ESF, Parent: coc1-4/2/0:7 (Index 304)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (Channelized T3 on Channelized OC12 IQ)

```
user@host> show interfaces ct3-0/2/0:1 extensive
Physical interface: ct3-0/2/0:1:1, Enabled, Physical link is Up
   Interface index: 220, SNMP ifIndex: 140, Generation: 222
   Link-level type: Controller, Clocking: Internal, Speed: T3, Loopback: None,
   Mode: C/Bit parity, Parent: cau4-0/2/0:1 Interface index 219
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : None
...
```

show interfaces extensive (CSTM4 on Channelized OC-12 IQ)

```
user@host> show interfaces cstm4-0/2/0 extensive
 Physical interface: cstm4-0/2/0, Enabled, Physical link is Up
   Interface index: 216, SNMP ifIndex: 33, Generation: 218
   Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC12,
   Loopback: None, Parent: None   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : None
...
```

show interfaces extensive (DS0 on Channelized OC12 IQ)

```
user@host> show interfaces extensive ds-4/2/0:7:1:1
Physical interface: ds-4/2/0:4:1:1, Enabled, Physical link is Up
  Interface index: 306, SNMP ifIndex: 2411, Generation: 641
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16, Parent: ct1-4/2/0:7:1 (Index 305)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
...
```

show interfaces extensive (SONET Interface on Channelized OC12 IQ)

```
user@host> show interfaces so-0/2/0:1 extensive
Physical interface: so-0/2/0:1, Enabled, Physical link is Up
  Interface index: 750, SNMP ifIndex: 23, Generation: 11709
  Link-level type: Multilink-FR, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, FCS: 16,
  Payload scrambler: Enabled, Parent: coc12-0/2/0 Interface index 749
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE
...
```

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show interfaces extensive (T1 on Channelized OC12 IQ)

```
user@host> show interfaces t1-0/2/0:1:1:1 extensive
   Physical interface: t1-0/2/0:1:1:1, Enabled, Physical link is Up
   Interface index: 222, SNMP ifIndex: 143, Generation: 226
   Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
   Loopback: None, FCS: 16, Framing: ESF, Parent: ct3-0/2/0:1:1
   Interface index 221
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : Keepalives
...
```


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show interfaces (Channelized OC3 IQ and IQE)

Syntax

show interfaces (*type-fpc/pic/port* <:*channel*><:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

(M Series and T Series routers only) Display status information about the specified channelized OC3 IQ or IQE interface.

Options

type-fpc/pic/port*:*channel*:*channel*:*channel—Interface type with optional corresponding channel levels. The interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical interface, ***type*** is **coc3**. For the clear channel, ***type*** is **so** (for OC3).
- ***type-fpc/pic/port*:*channel***—At the first level of channelization, ***type*** can be **coc1** (channelized OC1), **ct3** (from **coc1**), or **t3** (from **coc1**).
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ct1** (from **coc1** or **ct3**) or **t1** (from **coc1** or **ct3**).
- ***type-fpc/pic/port*:*channel*:*channel*:*channel***—At the third level of channelization, ***type*** can be **ds** (from **ct1**).

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces extensive (Channelized OC3 IQ) (Physical) on page 679
show interfaces extensive (Channelized OC1 on Channelized OC3 IQ) on page 680
show interfaces extensive (Channelized T1 on Channelized OC3 IQ) on page 681
show interfaces extensive (DS0 on Channelized OC3 IQ) on page 682

Output Fields

Table 43 on page 515 lists the output fields for the **show interfaces** (all Channelized OC interfaces) command. Output fields are listed in the approximate order in which they appear.

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Table 51: Channelized OC show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Description	Interface description.	All levels
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	SONET/SDH reference clock source. It can be **Internal** or **External**. Clocking is configured and displayed only for channel 0.	All levels
***Framing* mode**	Framing mode: **SONET** or **SDH**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
SONET loopback	Whether loopback is enabled on a SONET/SDH interface, and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16-bit**.	All levels
Payload scrambler	Whether payload scrambling is enabled.	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**

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Table 51: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
ANSI or ITU LMI settings	(Frame Relay) Settings for Local Management Interface (LMI). The format is **(ANSI or ITU) LMI settings: *value*, *value*... *nn*** seconds, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	All levels
LMI statistics	(Frame Relay) Statistics about the link management. • **Input**—Number of packets coming in on the interface (*nn*) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last sent *hh*:*mm*:*ss* ago)**. • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh*:*mm*:*ss* ago)**.	**detail extensive**
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none

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Table 51: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hh:mm:ss timezone year-month-day (hh:mm:ss*** **ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none
CoS Queues	Number of CoS queues configured.	**detail extensive** none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
DS1 alarms **DS1 defects**	E1or T1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. See the following list for all possible alarms and defects. For complete explanations of most of these alarms and defects, see *Bellcore Telcordia GR-499-CORE*. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 51: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
T1 media	Counts of T1 or E1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 or E1 media-specific error types are: • **SEF**—Severely errored framing • **BEE**—Bit error • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **YELLOW**—Errors at the remote site receiver • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CS**—Carrier state • **FEBE**—Far-end block error (E1 only) • **LES**—Line error seconds • **ES**—Errored seconds • **BES**—Bit error seconds • **SES**—Severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**

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Table 51: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **Giants**—Number of frames received that are larger than the giant threshold. • **Bucket Drops**—Drops caused by traffic load exceeding the interface transmit/receive leaky bucket configuration. The default is off. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value of this field increments, the PIC is malfunctioning. • **HS link FIFO overflows**—Number of FIFO overflows on the high-speed links between the ASICs responsible for handling the router interfaces. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 51: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions** —Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **HS link FIFO underflows**—Number of FIFO underflows on the high-speed links between the ASICs responsible for handling the router interfaces. • **MTU errors**—Number of packets whose size exceeds the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Egress queues	Total number of egress queues supported on the specified interface.	**detail extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
Active alarms **Active defects**	Defects that can prevent the interface from passing packets: • **None**—There are no active defects or alarms. • **LOF**—Loss of frame.	**detail extensive**
SONET alarms **SONET defects**	Media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: **SONET PHY**, **SONET section**, **SONET line**, and **SONET path**.	All levels

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Table 51: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SONET vt	SONET virtual-tributary (VT) alarms and defects: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B2**—Bit interleaved parity for SONET line overhead • **REI-V**—Remote error indication (near-end VT) • **LOP-V**—Loss of pointer (near-end VT) • **AIS-V**—Alarm indication signal (near-end VT) • **RDI-V**—Remote defect indication (near-end VT) • **UNEQ-V**—Unequipped (near-end VT) • **PLM-V**—Payload label mismatch (near-end VT) • **ES-V**—Errored seconds (near-end VT) • **SES-V**—Severely errored seconds (near-end VT) • **UAS-V**—Unavailable seconds (near-end VT) • **ES-VFE**—Errored seconds (far-end VT) • **SES-VFE**—Severely errored seconds (far-end VT) • **UAS-VFE**—Unavailable seconds (far-end VT)	**extensive**
SONET PHY	Counts of specific SONET errors with detailed information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **PLL Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**
SONET section	Counts of specific SONET errors with detailed information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B1**—Bit interleaved parity for SONET section overhead • **SEF**—Severely errored framing • **LOS**—Loss of signal • **LOL**—Loss of light • **LOF**—Loss of frame • **ES-S**—Errored seconds (section) • **SES-S**—Severely errored seconds (section) • **SEFS-S**—Severely errored framing seconds (section)	**extensive**

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Table 51: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SONET line	Active alarms and defects, plus counts of specific SONET errors with detailed information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State** —State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B2**—Bit interleaved parity for SONET line overhead • **REI-L**—Remote error indication (near-end line) • **RDI-L**—Remote defect indication (near-end line) • **AIS-L**—Alarm indication signal (near-end line) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **ES-L**—Errored seconds (near-end line) • **SES-L**—Severely errored seconds (near-end line) • **UAS-L**—Unavailable seconds (near-end line) • **ES-LFE**—Errored seconds (far-end line) • **SES-LFE**—Severely errored seconds (far-end line) • **UAS-LFE**—Unavailable seconds (far-end line)	**extensive**
SONET path	Active alarms and defects, plus counts of specific SONET errors with detailed information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B3**—Bit interleaved parity for SONET section overhead • **REI-P**—Remote error indication • **LOP-P**—Loss of pointer (path) • **AIS-P**—Path alarm indication signal • **RDI-P**—Path remote defect indication • **UNEQ-P**—Path unequipped • **PLM-P**—Path payload (signal) label mismatch • **ES-P**—Errored seconds (near-end STS path) • **SES-P**—Severely errored seconds (near-end STS path) • **UAS-P**—Unavailable seconds (near-end STS path) • **ES-PFE**—Errored seconds (far-end STS path) • **SES-PFE**—Severely errored seconds (far-end STS path) • **UAS-PFE**—Unavailable seconds (far-end STS path)	**extensive**

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Table 51: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Received SONET overhead **Transmitted SONET overhead**	Values of the received and transmitted SONET/SDH overhead: **F1**—Section user channel byte. This byte is set aside for the purposes of users. **S1**—Synchronization Status (S1). The S1 byte is located in the first STS-1 of an STS-*N*. Bits 5 through 8 convey the synchronization status of the network element. **Z3** and **Z4**—Path overhead. **V5**—Virtual Tributary (VT) path overhead byte.	**extensive**
SDH alarms **SDH defects**	SDH media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SDH PHY, SDH regenerator section, SDH multiplex section, and SDH path. NOTE: For controller based SONET PICs, the SDH alarms and SDH defects output in the **show interface coc3 extensive** command output only shows the section and line level defects. The path level defects can be found under the SONET (so) interface output.	All levels
SDH PHY	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **PLL Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**
SDH regenerator section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **RS-BIP8**—24-bit BIP for multiplex section overhead (B2 bytes) • **OOF**—Out of frame • **LOS**—Loss of signal • **LOF**—Loss of frame • **RS-ES**—Errored seconds (near-end regenerator section) • **RS-SES**—Severely errored seconds (near-end regenerator section) • **RS-SEFS**—Severely errored framing seconds (regenerator section)	**extensive**

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Table 51: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SDH multiplex section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **MS-BIP24**—8-bit BIP for high-order path overhead (B3 byte) • **MS-FEBE**—Far-end block error (multiplex section) • **MS-FERF**—Far-end remote fail (multiplex section) • **MS-AIS**—alarm indication signal (multiplex section) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **MS-ES**—Errored seconds (near-end multiplex section) • **MS-SES**—Severely errored seconds (near-end multiplex section) • **MS-UAS**—Unavailable seconds (near-end multiplex section) • **MS-ES-FE**—Errored seconds (far-end multiplex section) • **MS-SES-FE**—Severely errored seconds (far-end multiplex section) • **MS-UAS-FE**—Unavailable seconds (far-end multiplex section	**extensive**
SDH path	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **HP-BIP8**—8-bit BIP for regenerator section overhead (B1 byte) • **HP-FEBE**—Far-end block error (high-order path) • **HP-LOP**—Loss of pointer (high-order path) • **HP-AIS**—High-order-path alarm indication signal • **HP-FERF**—Far-end remote fail (high-order path) • **HP-UNEQ**—Unequipped (high-order path) • **HP-PLM**—Payload label mismatch (high-order path) • **HP-ES**—Errored seconds (near-end high-order path) • **HP-SES**—Severely errored seconds (near-end high-order path) • **HP-UAS**—Unavailable seconds (near-end high-order path) • **HP-ES-FE**—Errored seconds (far-end high-order path) • **HP-SES-FE**—Severely errored seconds (far-end high-order path) • **HP-UAS-FE**—Unavailable seconds (far-end high-order path)	**extensive**

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Table 51: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Received SDH overhead **Transmitted SDH overhead**	Values of the received and transmitted SONET overhead: • **C2**—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • **F1**—Section user channel byte. This byte is set aside for the purposes of users. • **K1** and **K2**—These bytes are allocated for APS signaling for the protection of the multiplex section. • **J0**—Section trace. This byte is defined for STS-1 number 1of an STS-*N* signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • **S1**—Synchronization status. The S1 byte is located in the first STS-1 of an STS-*N*. • **Z3** and **Z4**—Allocated for future use.	**extensive**
Received path trace **Transmitted path trace**	Channelized OC12 interfaces allow path trace bytes to be sent inband across the SONET/SDH link. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits. This information is specific to each of the 12 channelized OC12 interfaces.	**extensive**
DS3 media	Counts of T3 media-specific errors. For detailed definitions of the T3 (DS-3) error events (BPV, EXZ, LCV, PCV, and CCV) and performance parameters (LES, PES, PSES, CES, CSES, SEFS, and UAS), see RFC 2496. The DS3 or E3 media-specific error types can be: • **PLL Lock**—Phase-locked loop out of lock • **Reframing**—Frame alignment recovery time • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **IDLE**—Idle code detected • **YELLOW**—Errors at the remote site receiver • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—(DS3 only) Pulse code violation • **CCV**—(DS3 only) C-bit coding violation • **FEBE**—(DS3 only) Far-end block error • **LES**—Line error seconds • **PES**—(DS3 only) P-bit errored seconds • **PSES**—(DS3 only) P-bit errored seconds (section) • **CES**—(DS3 only) C-bit errored seconds • **CSES**—(DS3 only) C-bit severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**

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Table 51: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Line encoding**—Line encoding used. It is always **HDB3**. • **Byte encoding**—(T1 only) Byte encoding used: **Nx64K** or **Nx56K**. • **Line encoding**—Line encoding used. For T1, the value can be **B8ZS** or **AMI**. For E1, the value is **HDB3**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**. • **Idle cycle flag**—Idle cycle flags. • **Start end flag**—Start and end flag.	**extensive**
Interface transmit queues	Name of the transmit queues and their associated statistics for each DS3 channel on the Channelized OC12 PIC. • **B/W**—Queue bandwidth as a percentage of the total interface bandwidth. • **WRR**—Weighted round-robin (in percent). • **Packets**—Number of packets transmitted. • **Bytes**—Number of bytes transmitted. • **Drops**—Number of packets dropped. • **Errors**—Number of packet errors.	**extensive**
DSU configuration	Information about the DSU configuration. The last three lines (**Bit count**, **Error bit count**, and **LOS information**) are displayed only if a BERT has ever been run on the interface. • **Compatibility mode**—CSU/DSU compatibility mode: **None**, **Larscom**, **Kentrox**, or **Digital-Link**. • **Scrambling**—Payload scrambling. It can be **Enabled** or **Disabled**. • **Subrate**—Configured subrate setting. Applies only when**Digital-Link** compatibility mode is used. It can be **Disabled** or display units in kbps. • **FEAC loopback**—(T3) Whether a far-end alarm and control (FEAC) loopback is **Active** or **Inactive**. This feature is used to send alarm or status information from the far-end terminal back to the near-end terminal and to initiate T3 loopbacks at the far-end terminal from the near-end terminal. • **Response**—Whether the FEAC signal is **Enabled** or **Disabled**. • **Count**—Number of FEAC loopbacks.	**extensive**
BERT configuration	(DS interfaces) BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none

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Table 51: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Traffic statistics	Total number of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize. • **Input rate**—Rate of bits and packets received on the interface. • **Output rate**—Rate of bits and packets transmitted on the interface.	**detail extensive**
Local statistics	Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**

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Table 51: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Transit statistics	Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, or **mpls**.	**detail extensive** none
Multilink bundle	(If the logical interface is configured as part of a multilink bundle.) Interface name for the multilink bundle.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces extensive (Channelized OC3 IQ) (Physical)

```
user@host> show interfaces extensive coc3-0/0/0
Physical interface: coc3-0/0/0, Enabled, Physical link is Down
  Interface index: 128, SNMP ifIndex: 22, Generation: 11
  Description: pink coc3-0/0/0
```

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```
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: OC3,
  Loopback: None, Parent: None
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2005-01-27 16:39:21 PST (1w0d 22:09 ago)
  Statistics last cleared: Never
  SONET alarms   : PLL, LOS
  SONET defects  : PLL, LOF, LOS, SEF, AIS-L
  SONET PHY:            Seconds        Count  State
    PLL Lock             681767            1  PLL Lock Error
    PHY Light                 0            0  OK
  SONET section:
    BIP-B1                    0            0
    SEF                  681767            1  Defect Active
    LOS                  681767            1  Defect Active
    LOF                  681767            1  Defect Active
    ES-S                 681767
    SES-S                681767
    SEFS-S               681767
  SONET line:
    BIP-B2                    0            0
    REI-L                     0            0
    RDI-L                     0            0  OK
    AIS-L                681767            1  Defect Active
    BERR-SF                   0            0  OK
    BERR-SD                   0            0  OK
    ES-L                 681767
    SES-L                681767
    UAS-L                681757
    ES-LFE                    0
    SES-LFE                   0
    UAS-LFE                   0
  Received SONET overhead:
    F1      : 0x00, J0      : 0x00, K1      : 0xff, K2      : 0xff
    S1      : 0xff
  Transmitted SONET overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00
```

show interfaces extensive (Channelized OC1 on Channelized OC3 IQ)

```
user@host> show interfaces extensive coc1-0/0/0:1
Physical interface: coc1-0/0/0:1, Enabled, Physical link is Down
  Interface index: 133, SNMP ifIndex: 27, Generation: 16
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: 51840kbps,

   Loopback: None, Parent: coc3-0/0/0
 Interface index 128
  Device flags   : Present Running Down 16384
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2005-02-04 14:51:07 PST (00:00:35 ago)
  Statistics last cleared: Never
  SONET alarms   : None
  SONET defects  : AIS-P
  SONET path:
```


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```
    BIP-B3                    0            0
    REI-P                     0            0
    LOP-P                     0            0  OK
    AIS-P                    36            1  Defect Active
    RDI-P                     0            0  OK
    UNEQ-P                    0            0  OK
    PLM-P                     0            0  OK
    ES-P                     36
    SES-P                    36
    UAS-P                    26
    ES-PFE                    0
    SES-PFE                   0
    UAS-PFE                   0
  Received SONET overhead:
    C2      : 0xff, C2(cmp) : 0x01, F2      : 0x00, Z3      : 0x00
    Z4      : 0x00, S1(cmp) : 0x00
  Transmitted SONET overhead:
    C2      : 0x01, F2      : 0x00, Z3      : 0x00, Z4      : 0x00
  Received path trace:
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
  Transmitted path trace: router-1 coc1-0/0/0:1
    6b 61 76 65 72 69 20 63 6f 63 31 2d 30 2f 30 2f   router-1 coc1-0/0/0:1
    30 3a 31 00 00 00 00 00 00 00 00 00 00 00 00 00   ..............
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
```

show interfaces extensive (Channelized T1 on Channelized OC3 IQ)

```
user@host> show interfaces extensive ct1-0/0/0:1:1
Physical interface: ct1-0/0/0:1:1, Enabled, Physical link is Down
  Interface index: 134, SNMP ifIndex: 62, Generation: 17
  Link-level type: Controller, Clocking: Internal, Speed: T1, Loopback: None,
  Framing: ESF, Parent: coc1-0/0/0:1 Interface index 133
  Device flags   : Present Running Down 16384
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2005-02-04 14:54:35 PST (00:00:18 ago)
  Statistics last cleared: Never
  DS1   alarms   : None
  DS1   defects  : AIS, LOF
  T1  media:            Seconds        Count  State
    SEF                       1            1  OK
    BEE                       1            1  OK
    AIS                      18            1  Defect Active
    LOF                      18            1  Defect Active
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CS                        0            0
    LES                      18
    ES                       18
```

```
    SES                     18
    SEFS                    18
    BES                      0
    UAS                     14
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  SONET alarms    : None
  SONET defects   : None
  SONET vt:
    BIP-BIP2                 0           0
    REI-V                    0           0
    LOP-V                    0           0  OK
    AIS-V                   19           1  Defect Active
    RDI-V                   19           1  Defect Active
    UNEQ-V                   0           0  OK
    PLM-V                   19           1  Defect Active
    ES-V                    19
    SES-V                   19
    UAS-V                    9
    ES-VFE                   0
    SES-VFE                  0
    UAS-VFE                  0
  Received SONET overhead:
    V5      : 0x07, V5(cmp) : 0x02
  Transmitted SONET overhead:
    V5      : 0x02
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
```

show interfaces extensive (DS0 on Channelized OC3 IQ)

```
user@host> show interfaces extensive ds-0/0/0:1:1:1
Physical interface: ds-0/0/0:1:1:1, Enabled, Physical link is Down
  Interface index: 135, SNMP ifIndex: 63, Generation: 18
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 320kbps,
  Loopback: None, FCS: 16, Parent: ct1-0/0/0:1:1  Interface index 134
  Device flags   : Present Running
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : Never
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                    0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runs: 0, Giants: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
     Resource errors: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                    0                    0

    1 expedited-fo                  0                    0                    0
```


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```
  2 assured-forw                  0                    0                    0

  3 network-cont                  0                    0                    0

HDLC configuration:
  Giant threshold: 1514, Runt threshold: 2
  Timeslots      : 1-5
  Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
  Start end flag: shared
DS0 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)
```

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show interfaces controller (Channelized OC3 IQ and IQE)

Syntax show interfaces controller coc3-*fpc/pic/slot*

Release Information Command introduced before Junos OS Release 7.4.

Description Display a list of channels configured on a channelized OC3 IQ and IQE interface.

Options **coc3-*fpc/pic/slot***—channelized OC3 IQ or IQE interface name.

Required Privilege Level view

List of Sample Output show interfaces controller (Channelized OC3 IQ) on page 684

Output Fields Table 52 on page 684 lists the output fields for the **show interfaces controller** (Channelized OC3 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 52: Channelized OC3 IQ and IQE show interfaces controller Output Fields

Field Name	Field Description
Controller	Physical channelized interface name and the names of any channels configured on it.
Admin	Administrative status of the interface.
Link	Link status of the interface.

Sample Output

show interfaces controller (Channelized OC3 IQ)

```
user@host> show interfaces controller coc3-4/2/0
Controller                                                      Admin Link
coc3-4/2/0                                                      up    up
    coc1-4/2/0:1                                                up    up
        ct1-4/2/0:1:1                                           up    up
            ds-4/2/0:1:1:1                                      up    up
ct3-0/2/0                                                       up    up
ct3-0/2/1                                                       up    up
ct3-0/2/2                                                       up    up
ct3-0/2/3                                                       up    up
```


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show interfaces (Aggregated SONET/SDH)

Syntax

show interfaces as*number*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

(M Series and T Series routers only) Display status information about the specified aggregated SONET/SDH interface.

Options

as*number*—Display standard information about the specified aggregated SONET/SDH interface.

brief | detail | extensive | terse—(Optional) Display brief interface information.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

Related Documentation

- *Understanding Aggregated SONET/SDH Interfaces*

List of Sample Output

show interfaces (Aggregated SONET) on page 689
show interfaces brief (Aggregated SONET) on page 689
show interfaces detail (Aggregated SONET) on page 689
show interfaces extensive (Aggregated SONET) on page 690

Output Fields

Table 53 on page 685 lists the output fields for the **show interfaces** (aggregated SONET/SDH) command. Output fields are listed in the approximate order in which they appear.

Table 53: Aggregated SONET/SDH show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels

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Table 53: Aggregated SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Speed	Speed at which the interface is running.	All levels
Minimum links needed	Number of child links that must be operational for the aggregated interface to be operational.	**detail extensive** none
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is**1** through **255**, with a default of **1**. • **down-count** ***number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**.	All levels
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago).**	**detail extensive** none
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**

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Table 53: Aggregated SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Traffic statistics	Number of bytes and packets received and transmitted on the physical interface, and the traffic rate in bits per seconds (bps). • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface whose definitions are as follows: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **Giants**—Number of frames received that are larger than the giant threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **Resource errors**—Sum of transmit drops.	**extensive**
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **MTU errors**—Number of packets whose size exceeds the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Egress queues	Total number of egress queues supported on the specified interface.	**detail extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels

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Table 53: Aggregated SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Index	Logical interface's index number (which reflects its initialization sequence).	**detail extensive** none
SNMP ifIndex	Logical interface's SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Bandwidth	Interface bandwidth.	**detail extensive** none
Statistics	Information about fragments and packets received and sent by the router All references to traffic direction (input or output) are defined with respect to the router. Input fragments received by the router are assembled into input packets; output packets are segmented into output fragments for transmission out of the router. Statistics include input and output counts for packets, packets per second (pps), bytes, and bytes per second (Bps) for the following entities: • **Bundle**—Information about bundles. • **Link**—Information about links used in the multilink operation.	**detail extensive** none
protocol-family	Protocol family configured on the logical interface. If the protocol is **inet**, the source and destination address are also displayed.	**brief**
Protocol	Protocol family configured on the logical interface.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none

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Table 53: Aggregated SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**

Sample Output

show interfaces (Aggregated SONET)

```
user@host> show interfaces as0
Physical interface: as0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45
  Link-level type: PPP, MTU: 4474, Speed: 466560kbps, Minimum links needed: 1
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Last flapped   : Never
  Input rate     : 216 bps (1 pps)
  Output rate    : 48 bps (0 pps)

  Logical interface as0.0 (Index 79) (SNMP ifIndex 55)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    Bandwidth: 311040kbps
    Statistics        Packets        pps         Bytes          bps
    Bundle:
        Input :          1178          1         11772          176
        Output:             0          0             0            0
    Protocol inet, MTU: 4470
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.100.1.1, Local: 10.100.1.2
```

show interfaces brief (Aggregated SONET)

```
user@host> show interfaces as0 brief
Physical interface: as0, Enabled, Physical link is Up
  Link-level type: PPP, MTU: 4474, Speed: 466560kbps
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3

  Logical interface as0.0
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    inet  10.100.1.2       --> 10.100.1.1
```

show interfaces detail (Aggregated SONET)

```
user@host> show interfaces as0 detail
Physical interface: as0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 4474, Speed: 466560kbps, Minimum links needed: 1
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
```

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```
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Last flapped   : Never
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                15888                  272 bps
   Output bytes  :                 6189                   48 bps
   Input  packets:                 1547                    2 pps
   Output packets:                  393                    0 pps
  Egress queues: 4 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont              196806               196806                    0


  Logical interface as0.0 (Index 79) (SNMP ifIndex 55) (Generation 18)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    Bandwidth: 311040kbps
    Statistics        Packets        pps         Bytes          bps
    Bundle:
        Input :          1334          2         13332          232
        Output:             0          0             0            0
    Link:
      so-0/0/0.0 <-- down
        Input :             0          0             0            0
        Output:             0          0             0            0
      so-0/0/1.0
        Input :           541          1          5406          120
        Output:             0          0             0            0
      so-0/0/2.0
        Input :           793          1          7926          112
        Output:             0          0             0            0
    Protocol inet, MTU: 4470, Generation: 38, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.100.1.1, Local: 10.100.1.2, Broadcast: Unspecified,
        Generation: 40
```

show interfaces extensive (Aggregated SONET)

```
userhost1> show interfaces as0 extensive
Physical interface: as0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 4474, Speed: 466560kbps, Minimum links needed: 1
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Last flapped   : Never
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                17562                  136 bps
   Output bytes  :                 6862                   72 bps
   Input  packets:                 1710                    1 pps
   Output packets:                  436                    0 pps
```


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```
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, Resource errors: 0
Output errors:
  Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0,
  Resource errors: 0
Egress queues: 4 supported, 4 in use
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort                    0                    0                    0

  1 expedited-fo                   0                    0                    0

  2 assured-forw                   0                    0                    0

  3 network-cont              196848               196848                    0


Logical interface as0.0 (Index 79) (SNMP ifIndex 55) (Generation 18)
  Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
  Bandwidth: 311040kbps
  Statistics        Packets        pps         Bytes          bps
  Bundle:
      Input :          1475          1         14742          136
      Output:             0          0             0            0
  Link:
    so-0/0/0.0 <-- down
      Input :             0          0             0            0
      Output:             0          0             0            0
    so-0/0/1.0
      Input :           598          0          5976           24
      Output:             0          0             0            0
    so-0/0/2.0
      Input :           877          1          8766          112
      Output:             0          0             0            0
  Protocol inet, MTU: 4470, Generation: 38, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 10.100.1.1, Local: 10.100.1.2, Broadcast: Unspecified,
      Generation: 40
```

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show interfaces (Channelized DS3-to-DS0)

Syntax show interfaces ds-*fpc/pic/port:t1channel:ds0channel*
<brief | detail | extensive>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information about the specified channelized DS3-to-DS0 interface.

Options

ds-*fpc/pic/port:t1channel:ds0channel*—Display standard information about the specified channelized DS3-to-DS0 interface.

brief | detail | extensive—(Optional) Display the specified level of output interface.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output show interfaces extensive (Channelized DS3-to-DS0) on page 700

Output Fields Table 41 on page 477 lists the output fields for the **show interfaces** (all Channelized DS3 interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 54: Channelized DS3 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

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Table 54: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Mode	Whether C-bit parity mode or M13 mode is enabled.	All levels
Framing	Physical layer framing format used on the link. It can be **ESF** or **SF**. The default is **ESF**.	All levels
Parent	(Channelized IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets that a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 54: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	(PPP and HDLC) Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

LMI settings	(Frame Relay) Settings for Local Management Interface (LMI) can be either **ANSI LMI settings** or **ITU LMI settings**. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value***, *value*, *value*...*xx* seconds, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) LMI packet statistics: • **Input**—Number of packets coming in on the interface (*nn*) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)**. • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last seen *hh:mm:ss* ago)**.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none

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Table 54: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the**Success** state. (Most likely with RADIUS authentication). • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped: *year-month-day hour:minute:second timezone hh:mm:ss* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface. • **Input packets, Output packets**—Number of packets received and transmitted on the interface.	**detail extensive**

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Table 54: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Giants**—Number of frames received that are larger than the giant threshold. • **Runts**—Number of frames received that are smaller than the runt threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Counter increments when the software could not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • **HS link CRC errors**—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces.	**extensive**
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware.	**extensive**

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Table 54: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS1 alarms **DS1 defects**	Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none
T1 media	Counts of T1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 media-specific error types can be: • **SEF**—Severely errored framing • **BEE**—Bit error event • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **YELLOW**—Errors at the remote site receiver • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CS**—Carrier state • **LES**—Line error seconds • **ES**—Errored seconds • **SEFS**—Severely errored framing seconds (section) • **SES**—Severely errored seconds • **BES**—Bit error seconds • **UAS**—Unavailable seconds	**extensive**

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Table 54: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS3 media	Counts of T3 media-specific errors. For detailed definitions of the T3 (DS-3) error events (BPV, EXZ, LCV, PCV, and CCV) and performance parameters (LES, PES, PSES, CES, CSES, SEFS, and UAS), see RFC 2496. • **PLL Lock**—Phase-locked loop out of lock • **Reframing**—Frame alignment recovery time • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **IDLE**—Idle code detected • **YELLOW**—Remote defect indication • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CCV**—C-bit coding violation • **LES**—Line error seconds • **PES**—P-bit errored seconds • **PSES**—P-bit errored seconds (section) • **CES**—C-bit errored seconds • **CSES**—C-bit severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Byte encoding**—Byte encoding used: **Nx64K** or **Nx56K**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**	**extensive**
Interface transmit queues	Name of the transmit queues and their associated statistics for each DS1 channel on the Channelized DS3-to-DS1 PIC. • **B/W**—Queue bandwidth as a percentage of the total interface bandwidth. • **WRR**—Weighted round-robin (in percent). • **Packets**—Number of packets transmitted. • **Bytes**—Number of bytes transmitted. • **Drops**—Number of packets dropped. • **Errors**—Number of packet errors.	**extensive**

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Table 54: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS1 or DS3 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface; values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Bandwidth	Bandwidth configured on the interface.	All levels
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, **mpls**.	**detail extensive** none

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Table 54: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive** none
Redundant Link	(LSQ redundancy) Backup link for Link Services IQ redundancy.	**detail extensive** none

Sample Output

show interfaces extensive (Channelized DS3-to-DS0)

```
user@host> show interfaces ds-0/0/0:0:0 extensive
Physical interface: ds-0/0/0:0:0, Enabled, Physical link is Up
  Interface index: 174, SNMP ifIndex: 4298, Generation: 177
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps, FCS: 16,
  Mode: C/Bit parity, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 280 (last seen 00:00:09 ago)
    Output: 286 (last sent 00:00:00 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Not-configured
  Last flapped   : 2002-05-23 17:53:29 PDT (00:46:46 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                 6814                   16 bps
   Output bytes  :                28840                   72 bps
   Input  packets:                  568                    0 pps
   Output packets:                  893                    0 pps
  Input errors:
```


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```
  Errors: 0, Drops: 0, Framing errors: 39, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 2, L2 mismatch timeouts: 0,
  HS link CRC errors: 0
Output errors:
  Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
DS1   alarms   : None
DS3   alarms   : None
DS1   defects  : None
DS3   defects  : None
T1  media:            Seconds        Count  State
  SEF                       0            0  OK
  BEE                       5            1  OK
  AIS                       0            0  OK
  LOF                       0            0  OK
  LOS                       0            0  OK
  YELLOW                   17            1  OK
  BPV                       0            0
  EXZ                       0            0
  LCV                       5        27765
  PCV                       0            0
  CS                        0            0
  LES                       0
  ES                        0
  SES                       5
  SEFS                     10
  BES                       0
  UAS                       0
DS3 media:            Seconds        Count  State
  PLL Lock                  0            0  OK
  Reframing                 0            0  OK
  AIS                       0            0  OK
  LOF                       0            0  OK
  LOS                       0            0  OK
  IDLE                      0            0  OK
  YELLOW                    0            0  OK
  BPV                       1        65535
  EXZ                       1        65535
  LCV                       2       131070
  PCV                       1         1825
  CCV                       0            0
  LES                       1
  PES                       1
  PSES                      1
  CES                       0
  CSES                      0
  SEFS                      0
  UAS                       0
Interface transmit queues:
            B/W  WRR       Packets        Bytes        Drops       Errors
  Queue0     95   95             0            0            0            0
  Queue1      5    5           893        28840            0            0
HDLC configuration:
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : 1-10
  Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, Induced error rate: 10e-0
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
```

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```
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 2 (0x01)
  CoS information:    CoS transmit queue             Bandwidth           Buffer
Priority   Limit
                               %          bps   %         usec
    0 best-effort             95       608000  95            0      low    none
    3 network-control          5        32000   5            0      low    none
 Logical interface ds-0/0/0:0:0.0 (Index 5) (SNMP ifIndex 4299)
  (Generation 943)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 949, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 18.18.18.1, Local: 18.18.18.2, Broadcast: Unspecified,
        Generation: 1849
```


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show interfaces (Channelized DS3-to-DS1)

Syntax show interfaces t1-*fpc/pic/port*:*t1channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information about the specified channelized DS3-to-DS1 interface.

Options **t1-*fpc/pic/port*:*t1channel***—Display standard information about the specified channelized DS3-to-DS1 interface.

brief | detail | extensive | terse—(Optional) Display brief interface information.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output show interfaces extensive (channelized DS3-to-DS1) on page 703

Output Fields See the output field table for the show interfaces (Channelized DS3-to-DS0) command.

Sample Output

show interfaces extensive (channelized DS3-to-DS1)

```
user@host> show interfaces t1-0/0/0:0 extensive
Physical interface: t1-0/0/0:0, Enabled, Physical link is Up
  Interface index: 210, SNMP ifIndex: 14, Generation: 2977
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Mode: C/Bit parity, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 30 (last seen 00:00:05 ago)
    Output: 29 (last sent 00:00:00 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
```

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```
CHAP state: Not-configured
Last flapped   : 2002-05-23 17:30:12 PDT (17:29:43 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                  944                   16 bps
 Output bytes  :                 1162                   16 bps
 Input  packets:                   66                    0 pps
 Output packets:                   82                    0 pps
Input errors:
  Errors: 1, Drops: 0, Framing errors: 1, Policed discards: 8,
  L3 incompletes: 0, L2 channel errors: 1, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
DS1   alarms   : None
DS3   alarms   : None
DS1   defects  : None
DS3   defects  : None
T1  media:            Seconds        Count  State
  SEF                       0            0  OK
  BEE                      11            5  OK
  AIS                      28            1  OK
  LOF                      27            1  OK
  LOS                       0            0  OK
  YELLOW                   23            1  OK
  BPV                       0            0
  EXZ                       0            0
  LCV                      11        20574
  PCV                       0            0
  CS                        0            0
  LES                      28
  ES                       28
  SES                      39
  SEFS                     50
  BES                       0
  UAS                       0
DS3 media:            Seconds        Count  State
  PLL Lock                  0            0  OK
  Reframing                 0            0  OK
  AIS                       0            0  OK
  LOF                       1            1  OK
  LOS                       1            1  OK
  IDLE                      0            0  OK
  YELLOW                    0            0  OK
  BPV                       2       131070
  EXZ                       3        49910
  LCV                       5       180980
  PCV                       2          327
  CCV                      12       264558
  LES                       3
  PES                       3
  PSES                      2
  CES                      13
  CSES                     13
  SEFS                      1
  UAS                      35
Interface transmit queues:
            B/W  WRR       Packets        Bytes        Drops       Errors
  Queue0     95   95             0            0            0            0
  Queue1      5    5            82         1162            0            0
HDLC configuration:
```


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```
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : 1-10
  Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, Induced error rate: 10e-0
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 2 (0x00)  CoS information:
  CoS transmit queue             Bandwidth           Buffer Priority   Limit
                            %          bps   %         usec
  0 best-effort            95       608000  95            0      low    none
  3 network-control         5        32000   5            0      low    none
Logical interface t1-0/0/0:0.0 (Index 11) (SNMP ifIndex 23) (Generation 497)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Bandwidth: 0
  Protocol inet, MTU: 1500, Generation: 576, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 21.21.21.2, Local: 21.21.21.1, Broadcast: Unspecified,
      Generation: 977
```

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show interfaces (Channelized E1 IQ)

Syntax show interfaces (ce1-*fpc/pic/port* | *type-fpc/pic/port*<:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information about the specified channelized E1 IQ interface.

Options ***type-fpc/pic/port*:<*channel*>**—Interface type with optional corresponding channel levels. For the physical channelized E1 IQ interface, ***type*** is **ce**. For the clear channel, ***type*** is **e1**. At the first level of channelization, ***type*** is **ds**.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output
show interfaces (Channelized E1 IQ) (Physical) on page 706
show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation) on page 707
show interfaces extensive (Channelized E1 IQ MLFR Encapsulation) on page 708
show interfaces detail (Clear Channel E1) on page 709

Output Fields For information about output fields, see the output field table for the show interfaces (Channelized E1) command. Output fields are listed in the approximate order in which they appear.

Sample Output

show interfaces (Channelized E1 IQ) (Physical)

```
user@host> show interfaces ce1-1/2/3
Physical interface: ce1-1/2/3, Enabled, Physical link is Up
  Interface index: 18, SNMP ifIndex: 1128
  Link-level type: Frame-relay, Controller, MTU: 1504, Clocking: Internal,   Speed:
 E1, Loopback: None, FCS: 16, Framing: G704, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
```

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```
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                     : 43186
    Full enquiries sent                : 8515
    Enquiry responses received         : 43185
    Full enquiry responses received    : 8515
  DCE statistics:
    Enquiries received                 : 0
    Full enquiries received            : 0
    Enquiry responses sent             : 0
    Full enquiry responses sent        : 0
  Common statistics:
    Unknown messages received          : 0
    Asynchronous updates received      : 0
    Out-of-sequence packets received   : 0
    Keepalive responses timedout       : 0
  Nonmatching DCE-end DLCIs:
          2
  Last flapped   : 2002-10-04 17:52:51 PDT (00:32:57 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None
```

show interfaces extensive (Channelized E1 IQ Multilink PPP Encapsulation)

```
user@host> show interfaces ds-0/3/4:1 extensive
Physical interface: ds-0/3/4:1, Enabled, Physical link is Up
  Interface index: 151, SNMP ifIndex: 63, Generation: 34
  Link-level type: Multilink-PPP, MTU: 1518, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16,
  Parent: ce1-0/3/4 Interface index 150
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  CHAP state: Closed
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : Never
  Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :             6070570                 224 bps
   Input  packets:                   0                   0 pps
   Output packets:              209330                   0 pps
  Input errors:
    Errors: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
     Resource errors: 0
  HDLC configuration:
    Giant threshold: 1528, Runt threshold: 2
    Timeslots      : 1
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
```

```
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)

  Logical interface ds-0/3/4:1.0 (Index 74) (SNMP ifIndex 64) (Generation 13)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol mlppp, Multilink bundle: ls-0/1/0.0, MTU: 1514, Generation: 24,
    Route table: 0
```

show interfaces extensive (Channelized E1 IQ MLFR Encapsulation)

```
user@host> show interfaces ds-0/3/4:5 extensive
Physical interface: ds-0/3/4:5, Enabled, Physical link is Up
  Interface index: 155, SNMP ifIndex: 72, Generation: 38
  Link-level type: Multilink-FR, MTU: 1518, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16,
  Parent: ce1-0/3/4 Interface index 150
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : No-Keepalives DCE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n392dce 3, n393dce 4, t392dce 15 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  DTE statistics:
    Enquiries sent                      : 0
    Full enquiries sent                 : 0
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
    Keepalive responses timedout        : 0
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : 2005-12-21 09:59:01 PST (1w0d 03:44 ago)
  Statistics last cleared: 2005-12-21 10:32:15 PST (1w0d 03:10 ago)
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
  Input errors:
    Errors: 3, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
     Resource errors: 0
  HDLC configuration:
    Giant threshold: 1528, Runt threshold: 2
    Timeslots      : 5
    Data inversion: Disabled, Idle cycle flag: flags, Start end flag: shared
```


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```
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x01)

  Logical interface ds-0/3/4:5.0 (Index 78) (SNMP ifIndex 73) (Generation 17)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                    0 bps
     Output bytes  :                   0                    0 bps
     Input  packets:                   0                    0 pps
     Output packets:                   0                    0 pps
    Protocol mlfr, Multilink bundle: ls-0/1/0.1, MTU: 1514, Generation: 28, Route
 table: 0
    DLCI 10
      Flags: Active
      Total down time: 0 sec, Last down: Never
      Traffic statistics:
       Input  bytes  :                 0
       Output bytes  :                 0
       Input  packets:                 0
       Output packets:                 0
  DLCI statistics:
    Active DLCI  :1  Inactive DLCI  :0
```

show interfaces detail (Clear Channel E1)

```
user@host> show interfaces e1-1/2/6 detail
Physical interface: e1-1/2/6, Enabled, Physical link is Up
  Interface index: 89, SNMP ifIndex: 1278, Generation: 341
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1, Loopback:None,
...
  Logical interface e1-1/2/6.0 (Index 52) (SNMP ifIndex 1279) (Generation 169)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
...
```

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show interfaces (Channelized E1)

Syntax show interfaces ds-*fpc/pic/port:ds0channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information the specified channelized E1 interface.

Options

ds-*fpc/pic/port:ds0channel*—Display standard information about the specified channelized E1 interface.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output show interfaces extensive (Channelized E1) on page 718

Output Fields Table 42 on page 495 lists the output fields for the **show interfaces** (Channelized E1 and Channelized E1 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 55: Channelized E1 and Channelized E1 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

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Table 55: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used on the link. It can be **G704**, **G704-NO-CRC4**, or **Unframed**. The default is **G704**.	All levels
Parent	(Channelized E1 IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **Interval *seconds***—Time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **Down-count *number***—Number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **Up-count *number***—Number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 55: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	(PPP and HDLC) Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  ◦ (**last seen 00:00:00 ago**)—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  ◦ (**last seen 00:00:00 ago**)—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

LMI settings	(Frame Relay) Settings for link management can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx*** seconds, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) Statistics about the link management. • **Input**—Number of packets coming in on the interface (*nn*) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)** • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh:mm:ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 55: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for**n392dte** or **n393dce** intervals. (See **LMI settings**).	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay, displayed only from the DTE) Number of DLCIs configured from the DCE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none
CoS Queues	Number of CoS queues configured.	**detail extensive** none
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output Rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**

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Table 55: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Traffic statistics	Number of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Giants**—Number of frames received that are larger than the giant threshold. • **Runts**—Number of frames received that are smaller than the runt threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 55: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), then either the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets larger than the MTU threshold. • **Resource errors**—Sum of transmit drops.	**extensive**
DS1 alarms **DS1 defects**	E1 media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see *Bellcore Telcordia GR-499-CORE*. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 55: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
E1 media	Active alarms and defects, plus counts of specific E1 errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than OK indicates a problem. The E1 media-specific error types can be: • **SEF**—Severely errored framing • **BEE**—Bit error • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **YELLOW**—Errors at the remote site receiver • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CS**—Carrier state • **FEBE**—Far-end block error • **LES**—Line error seconds • **ES**—Errored seconds • **BES**—Bursty errored seconds • **SES**—Severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Line encodingHDB3**—Line encoding used.	**extensive**
Interface transmit queues	Names of the transmit queues and their associated statistics for each DS0 channel on the Channelized E1 to DS0 PIC. • **B/W**—Queue bandwidth as a percentage of the total interface bandwidth. • **WRR**—Weighted round robin (in percent). • **Packets**—Number of packets transmitted. • **Bytes**—Number of bytes transmitted. • **Drops**—Number of packets dropped. • **Errors**—Number of packet errors.	**extensive**

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Table 55: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS*x* BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified

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Table 55: Channelized E1 and Channelized E1 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Traffic statistics	Number and rate of bytes and packets received and transmitted on the logical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than one second) for this counter to stabilize.	**detail extensive**
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, **mpls**.	**detail extensive** none
Multilink bundle	(Multilink) Interface name for the multilink bundle, if configured.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces extensive (Channelized E1)

```
user@host> show interfaces ds-0/1/1:1 extensive
```


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```
Physical interface: ds-0/1/1:1, Enabled, Physical link is Down
  Interface index: 163, SNMP ifIndex: 37, Generation: 46
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : 2005-12-28 14:44:06 PST (00:00:30 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
     Resource errors: 0
  DS1   alarms   : LOF, LOS
  DS1   defects  : LOF, LOS
  E1  media:            Seconds        Count  State
    SEF                  982318            1  Defect Active
    BEE                       0            0  OK
    AIS                       0            0  OK
    LOF                  982318            1  Defect Active
    LOS                  982318            1  Defect Active
    YELLOW                    0            0  OK
    BPV                       1            1
    EXZ                       1            1
    LCV                       1            1
    PCV                       1            2
    CS                        0            0
    FEBE                      1            9
    LES                       1
    ES                   982318
    SES                  982318
    SEFS                 982318
    BES                       1
    UAS                       0
  Interface transmit queues:
              B/W  WRR       Packets        Bytes        Drops       Errors
    Queue0     95   95             0            0            0            0
    Queue1      5    5             0            0            0            0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 3
    Timeslots      : 31
    Line encoding: HDB3, Data inversion: Disabled, Idle cycle flag: flags,
    Start end flag: shared
  DS1 BERT configuration:
    BERT time period: 0 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^11 - 1, O.152 and O.153 (2047 type),
     Pseudorandom (8)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 2 (0x1b)
  CoS information:
    CoS transmit queue     Bandwidth        Buffer   Priority   Limit
```

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```
                     %         bps     %   usec
  0 best-effort     95     1945600    95      0          low    none
  3 network-control  5      102400     5      0          low    none
```


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show interfaces (Channelized OC12 IQ and IQE)

Syntax show interfaces (*type-fpc/pic/port*<:*channel*><:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description Display status information about the specified channelized OC12 IQ and IQE interface.

Options ***type-fpc/pic/port*:*channel*:*channel*:*channel***—Interface type with optional corresponding channel levels.

For SONET mode, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized OC12 IQ or IQE interface, ***type*** is **coc12**. For the clear channel, ***type*** is **so** (for OC12).
- ***type-fpc/pic/port*:*channel***—At the first level of channelization, ***type*** can be **coc1**(channelized OC1), **ct3** (from **coc1)**, **so** (for OC3), or **t3.**
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ct1** (from **ct3**or **coc1)** or **t1** (from **ct3** or **coc1)**.
- ***type-fpc/pic/port*:*channel*:*channel*:*channel***—At the third level of channelization, ***type*** is **ds** (from **ct1**).

For SDH mode, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized OC12 IQ or IQE interface, ***type*** is **cstm4**. For the clear channel, ***type*** is **so** (for SONET/SDH (vc-4-4c)).
- ***type-fpc/pic/port*:*channel***—At the first level of channelization,***type*** can be **so** (from **cstm4)** or **cau4** (from **cstm4)**.
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ct3**or **t3** (from or **cau4)**.
- ***type-fpc/pic/port*:*channel*:*channel*:*channel***—At the third level of channelization, ***type*** is **ct1** or **t1** (from **ct3**).
- ***type-fpc/pic/port*:*channel*:*channel*:*channel***—At the fourth level of channelization, ***type*** is **ds** (from **ct1**).

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

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statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output
show interfaces extensive (CAU4 on Channelized OC-12 IQ) on page 722
show interfaces extensive (Channelized OC1 on Channelized OC12 IQ) on page 722
show interfaces extensive (Channelized OC12 IQ) (Physical) on page 722
show interfaces extensive (Channelized T1 from Channelized OC12 IQ) on page 723
show interfaces extensive (Channelized T3 on Channelized OC12 IQ) on page 723
show interfaces extensive (CSTM4 on Channelized OC-12 IQ) on page 723
show interfaces extensive (DS0 on Channelized OC12 IQ) on page 723
show interfaces extensive (SONET Interface on Channelized OC12 IQ) on page 723
show interfaces extensive (T1 on Channelized OC12 IQ) on page 724

Output Fields See the output field table for the show interfaces (Channelized OC3 IQ and IQE) command.

Sample Output

show interfaces extensive (CAU4 on Channelized OC-12 IQ)

```
user@host> show interfaces cau4-0/2/0:1 extensive
Physical interface: cau4-0/2/0:1, Enabled, Physical link is Up
   Interface index: 219, SNMP ifIndex: 139, Generation: 221
   Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC3,
   Loopback: None, Parent: cstm4-0/2/0 Interface index 216
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : None
...
```

show interfaces extensive (Channelized OC1 on Channelized OC12 IQ)

```
user@host> show interfaces extensive coc1-4/2/0:7
Physical interface: coc1-4/2/0:7, Enabled, Physical link is Up
  Interface index: 381, SNMP ifIndex: 2524, Generation: 728
  Link-level type: Controller, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: 51840kbps, Loopback: None,
  FCS: 16, Payload scrambler: Disabled, Parent: coc12-4/2/0 (Index 266)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (Channelized OC12 IQ) (Physical)

```
user@host> show interfaces extensive coc12-4/2/0
Physical interface: coc12-4/2/0, Enabled, Physical link is Up
  Interface index: 266, SNMP ifIndex: 1269, Generation: 601
  Link-level type: Controller, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: OC12, Loopback: None,
  FCS: 16, Payload scrambler: Disabled, Parent: None  Device flags   : Present
Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
...
```


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show interfaces extensive (Channelized T1 from Channelized OC12 IQ)

```
user@host> show interfaces extensive ct1-4/2/0:7:1
Physical interface: ct1-4/2/0:4:1, Enabled, Physical link is Up
  Interface index: 305, SNMP ifIndex: 2410, Generation: 640
  Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16,
  Framing: ESF, Parent: coc1-4/2/0:7 (Index 304)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (Channelized T3 on Channelized OC12 IQ)

```
user@host> show interfaces ct3-0/2/0:1 extensive
Physical interface: ct3-0/2/0:1:1, Enabled, Physical link is Up
   Interface index: 220, SNMP ifIndex: 140, Generation: 222
   Link-level type: Controller, Clocking: Internal, Speed: T3, Loopback: None,
   Mode: C/Bit parity, Parent: cau4-0/2/0:1 Interface index 219
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : None
...
```

show interfaces extensive (CSTM4 on Channelized OC-12 IQ)

```
user@host> show interfaces cstm4-0/2/0 extensive
 Physical interface: cstm4-0/2/0, Enabled, Physical link is Up
   Interface index: 216, SNMP ifIndex: 33, Generation: 218
   Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC12,
   Loopback: None, Parent: None   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : None
...
```

show interfaces extensive (DS0 on Channelized OC12 IQ)

```
user@host> show interfaces extensive ds-4/2/0:7:1:1
Physical interface: ds-4/2/0:4:1:1, Enabled, Physical link is Up
  Interface index: 306, SNMP ifIndex: 2411, Generation: 641
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 64kbps,
  Loopback: None, FCS: 16, Parent: ct1-4/2/0:7:1 (Index 305)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
...
```

show interfaces extensive (SONET Interface on Channelized OC12 IQ)

```
user@host> show interfaces so-0/2/0:1 extensive
Physical interface: so-0/2/0:1, Enabled, Physical link is Up
  Interface index: 750, SNMP ifIndex: 23, Generation: 11709
  Link-level type: Multilink-FR, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, FCS: 16,
  Payload scrambler: Enabled, Parent: coc12-0/2/0 Interface index 749
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE
...
```

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show interfaces extensive (T1 on Channelized OC12 IQ)

```
user@host> show interfaces t1-0/2/0:1:1:1 extensive
   Physical interface: t1-0/2/0:1:1:1, Enabled, Physical link is Up
   Interface index: 222, SNMP ifIndex: 143, Generation: 226
   Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
   Loopback: None, FCS: 16, Framing: ESF, Parent: ct3-0/2/0:1:1
   Interface index 221
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : Keepalives
...
```


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show interfaces (Channelized OC12)

Syntax
show interfaces t3-*fpc/pic/port*:*t3channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information
Command introduced before Junos OS Release 7.4.

Description
Display status information about the specified channelized OC12 interface.

Options
t3-*fpc/pic/port*:*t3channel*—Display standard information about the specified channelized OC12 interface.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level
view

List of Sample Output
show interfaces extensive (Channelized OC12) on page 725

Output Fields
See the output field table for the show interfaces (Channelized OC3 IQ and IQE) command.

Sample Output

show interfaces extensive (Channelized OC12)

```
user@host> show interfaces t3-0/3/0:0 extensive
Physical interface: t3-0/3/0:0, Enabled, Physical link is Up
  Interface index: 32, SNMP ifIndex: 21, Generation: 2719
  Link-level type: Frame-Relay, PPP, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: T3, Loopback: None, SONET Loopback: None, FCS: 16, Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
```

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```
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
  Hold-times     : Up 0 ms, Down 0 ms
  Last flapped   : 2002-05-23 16:59:03 PDT (18:23:58 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                1700                    0 bps
   Output bytes  :                1714                    0 bps
   Input  packets:                 123                    0 pps
   Output packets:                 124                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 1100817, Bucket drops: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
  DS3   alarms   : None
  SONET alarms   : None
  DS3   defects  : None
  SONET defects  : None
  DS3 media:            Seconds        Count  State
    AIS                       0            0  OK
    LOF                      18            1  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                      36       122399
    CCV                      72        91948
    LES                       0
    PES                      18
    PSES                     18
    CES                      18
    CSES                     18
    SEFS                     18
    UAS                       0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 4484, Runt threshold: 3
  DSU configuration:
    Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
    FEAC loopback: Inactive, Response: Disabled, Count: 0
  DS3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: Unknown (0), Induced error rate: 10e-0
Interface transmit queues:
              B/W  WRR       Packets        Bytes        Drops       Errors
    Queue0     95   95             0            0            0            0
    Queue1      5    5           529         6348            0            0
```


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```
SONET PHY:            Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                20            1  OK
SONET section:
  BIP-B1                    0            0
  SEF                      20            1  OK
  LOS                      20            1  OK
  LOF                      20            1  OK
  ES-S                     20
  SES-S                    20
  SEFS-S                   20
SONET line:
  BIP-B2                    0            0
  REI-L                     0            0
  RDI-L                     0            0  OK
  AIS-L                     0            0  OK
  BERR-SF                  18            1  OK
  BERR-SD                   2            1  OK
  ES-L                     20
  SES-L                    20
  UAS-L                    10
  ES-LFE                    0
  SES-LFE                   0
  UAS-LFE                   0
SONET path:
  BIP-B3                    0            0
  REI-P                     0            0
  LOP-P                    20            1  OK
  AIS-P                     0            0  OK
  RDI-P                     0            0  OK
  UNEQ-P                    0            0  OK
  PLM-P                    20            1  OK
  ES-P                     20
  SES-P                    20
  UAS-P                    10
  ES-PFE                    0
  SES-PFE                   0
  UAS-PFE                   0
Received SONET overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, C2(cmp) : 0x04, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00, V5      : 0x00
  V5(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x04, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00, V5      : 0x00
Received path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 0d 0a   t3-0/3/0:0......
Transmitted path trace: t3-0/3/0:0
  74 33 2d 30 2f 33 2f 30 3a 30 00 00 00 00 00 00   t3-0/3/0:0......
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue              Bandwidth           Buffer Priority   Limit
                             %          bps   %         usec
  0 best-effort             95     42499200  95            0      low    none
  3 network-control          5      2236800   5            0      low    none
Logical interface t3-0/3/0:0.0 (Index 11) (SNMP ifIndex 268) (Generation 499)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 4470, Generation: 578, Route table: 0
```

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```
     Flags: None
     Addresses, Flags: Is-Preferred Is-Primary
       Destination: 22.22.22.1, Local: 22.22.22.2, Broadcast: Unspecified,
Generation: 98
DLCI 100
     Flags: Active, Dce-configured
     Total down time: 0 sec, Last down: Never
     Traffic statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
 DLCI statistics:
   Active DLCI  :2 Inactive DLCI  : 0
```


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show interfaces (Channelized OC3 IQ and IQE)

Syntax

show interfaces (*type-fpc/pic/port* <:*channel*><:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

(M Series and T Series routers only) Display status information about the specified channelized OC3 IQ or IQE interface.

Options

type-fpc/pic/port*:*channel*:*channel*:*channel—Interface type with optional corresponding channel levels. The interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical interface, ***type*** is **coc3**. For the clear channel, ***type*** is **so** (for OC3).
- ***type-fpc/pic/port*:*channel***—At the first level of channelization, ***type*** can be **coc1** (channelized OC1), **ct3** (from **coc1**), or **t3** (from **coc1**).
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ct1** (from **coc1** or **ct3**) or **t1** (from **coc1** or **ct3**).
- ***type-fpc/pic/port*:*channel*:*channel*:*channel***—At the third level of channelization, ***type*** can be **ds** (from **ct1**).

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces extensive (Channelized OC3 IQ) (Physical) on page 743
show interfaces extensive (Channelized OC1 on Channelized OC3 IQ) on page 744
show interfaces extensive (Channelized T1 on Channelized OC3 IQ) on page 745
show interfaces extensive (DS0 on Channelized OC3 IQ) on page 746

Output Fields

Table 43 on page 515 lists the output fields for the **show interfaces** (all Channelized OC interfaces) command. Output fields are listed in the approximate order in which they appear.

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Table 56: Channelized OC show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Description	Interface description.	All levels
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	SONET/SDH reference clock source. It can be **Internal** or **External**. Clocking is configured and displayed only for channel 0.	All levels
***Framing* mode**	Framing mode: **SONET** or **SDH**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
SONET loopback	Whether loopback is enabled on a SONET/SDH interface, and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16-bit**.	All levels
Payload scrambler	Whether payload scrambling is enabled.	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**

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Table 56: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
ANSI or ITU LMI settings	(Frame Relay) Settings for Local Management Interface (LMI). The format is **(ANSI or ITU) LMI settings: *value*, *value*... *nn*** seconds, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	All levels
LMI statistics	(Frame Relay) Statistics about the link management. • **Input**—Number of packets coming in on the interface (*nn*) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last sent *hh*:*mm*:*ss* ago)**. • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh*:*mm*:*ss* ago)**.	**detail extensive**
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none

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Table 56: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped: *year-month-day hh:mm:ss timezone year-month-day* (*hh:mm:ss* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none
CoS Queues	Number of CoS queues configured.	**detail extensive** none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
DS1 alarms **DS1 defects**	E1or T1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. See the following list for all possible alarms and defects. For complete explanations of most of these alarms and defects, see *Bellcore Telcordia GR-499-CORE*. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 56: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
T1 media	Counts of T1 or E1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 or E1 media-specific error types are: • **SEF**—Severely errored framing • **BEE**—Bit error • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **YELLOW**—Errors at the remote site receiver • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CS**—Carrier state • **FEBE**—Far-end block error (E1 only) • **LES**—Line error seconds • **ES**—Errored seconds • **BES**—Bit error seconds • **SES**—Severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**

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Table 56: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **Giants**—Number of frames received that are larger than the giant threshold. • **Bucket Drops**—Drops caused by traffic load exceeding the interface transmit/receive leaky bucket configuration. The default is off. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value of this field increments, the PIC is malfunctioning. • **HS link FIFO overflows**—Number of FIFO overflows on the high-speed links between the ASICs responsible for handling the router interfaces. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 56: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions** —Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **HS link FIFO underflows**—Number of FIFO underflows on the high-speed links between the ASICs responsible for handling the router interfaces. • **MTU errors**—Number of packets whose size exceeds the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Egress queues	Total number of egress queues supported on the specified interface.	**detail extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
Active alarms **Active defects**	Defects that can prevent the interface from passing packets: • **None**—There are no active defects or alarms. • **LOF**—Loss of frame.	**detail extensive**
SONET alarms **SONET defects**	Media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: **SONET PHY**, **SONET section**, **SONET line**, and **SONET path**.	All levels

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Table 56: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SONET vt	SONET virtual-tributary (VT) alarms and defects: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B2**—Bit interleaved parity for SONET line overhead • **REI-V**—Remote error indication (near-end VT) • **LOP-V**—Loss of pointer (near-end VT) • **AIS-V**—Alarm indication signal (near-end VT) • **RDI-V**—Remote defect indication (near-end VT) • **UNEQ-V**—Unequipped (near-end VT) • **PLM-V**—Payload label mismatch (near-end VT) • **ES-V**—Errored seconds (near-end VT) • **SES-V**—Severely errored seconds (near-end VT) • **UAS-V**—Unavailable seconds (near-end VT) • **ES-VFE**—Errored seconds (far-end VT) • **SES-VFE**—Severely errored seconds (far-end VT) • **UAS-VFE**—Unavailable seconds (far-end VT)	**extensive**
SONET PHY	Counts of specific SONET errors with detailed information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **PLL Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**
SONET section	Counts of specific SONET errors with detailed information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B1**—Bit interleaved parity for SONET section overhead • **SEF**—Severely errored framing • **LOS**—Loss of signal • **LOL**—Loss of light • **LOF**—Loss of frame • **ES-S**—Errored seconds (section) • **SES-S**—Severely errored seconds (section) • **SEFS-S**—Severely errored framing seconds (section)	**extensive**

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Table 56: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SONET line	Active alarms and defects, plus counts of specific SONET errors with detailed information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State** —State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B2**—Bit interleaved parity for SONET line overhead • **REI-L**—Remote error indication (near-end line) • **RDI-L**—Remote defect indication (near-end line) • **AIS-L**—Alarm indication signal (near-end line) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **ES-L**—Errored seconds (near-end line) • **SES-L**—Severely errored seconds (near-end line) • **UAS-L**—Unavailable seconds (near-end line) • **ES-LFE**—Errored seconds (far-end line) • **SES-LFE**—Severely errored seconds (far-end line) • **UAS-LFE**—Unavailable seconds (far-end line)	**extensive**
SONET path	Active alarms and defects, plus counts of specific SONET errors with detailed information: • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B3**—Bit interleaved parity for SONET section overhead • **REI-P**—Remote error indication • **LOP-P**—Loss of pointer (path) • **AIS-P**—Path alarm indication signal • **RDI-P**—Path remote defect indication • **UNEQ-P**—Path unequipped • **PLM-P**—Path payload (signal) label mismatch • **ES-P**—Errored seconds (near-end STS path) • **SES-P**—Severely errored seconds (near-end STS path) • **UAS-P**—Unavailable seconds (near-end STS path) • **ES-PFE**—Errored seconds (far-end STS path) • **SES-PFE**—Severely errored seconds (far-end STS path) • **UAS-PFE**—Unavailable seconds (far-end STS path)	**extensive**

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Table 56: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Received SONET overhead **Transmitted SONET overhead**	Values of the received and transmitted SONET/SDH overhead: **F1**—Section user channel byte. This byte is set aside for the purposes of users. **S1**—Synchronization Status (S1). The S1 byte is located in the first STS-1 of an STS-*N*. Bits 5 through 8 convey the synchronization status of the network element. **Z3** and **Z4**—Path overhead. **V5**—Virtual Tributary (VT) path overhead byte.	**extensive**
SDH alarms **SDH defects**	SDH media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SDH PHY, SDH regenerator section, SDH multiplex section, and SDH path. NOTE: For controller based SONET PICs, the SDH alarms and SDH defects output in the **show interface coc3 extensive** command output only shows the section and line level defects. The path level defects can be found under the SONET (so) interface output.	All levels
SDH PHY	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **PLL Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**
SDH regenerator section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **RS-BIP8**—24-bit BIP for multiplex section overhead (B2 bytes) • **OOF**—Out of frame • **LOS**—Loss of signal • **LOF**—Loss of frame • **RS-ES**—Errored seconds (near-end regenerator section) • **RS-SES**—Severely errored seconds (near-end regenerator section) • **RS-SEFS**—Severely errored framing seconds (regenerator section)	**extensive**

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Table 56: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SDH multiplex section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **MS-BIP24**—8-bit BIP for high-order path overhead (B3 byte) • **MS-FEBE**—Far-end block error (multiplex section) • **MS-FERF**—Far-end remote fail (multiplex section) • **MS-AIS**—alarm indication signal (multiplex section) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **MS-ES**—Errored seconds (near-end multiplex section) • **MS-SES**—Severely errored seconds (near-end multiplex section) • **MS-UAS**—Unavailable seconds (near-end multiplex section) • **MS-ES-FE**—Errored seconds (far-end multiplex section) • **MS-SES-FE**—Severely errored seconds (far-end multiplex section) • **MS-UAS-FE**—Unavailable seconds (far-end multiplex section	**extensive**
SDH path	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **HP-BIP8**—8-bit BIP for regenerator section overhead (B1 byte) • **HP-FEBE**—Far-end block error (high-order path) • **HP-LOP**—Loss of pointer (high-order path) • **HP-AIS**—High-order-path alarm indication signal • **HP-FERF**—Far-end remote fail (high-order path) • **HP-UNEQ**—Unequipped (high-order path) • **HP-PLM**—Payload label mismatch (high-order path) • **HP-ES**—Errored seconds (near-end high-order path) • **HP-SES**—Severely errored seconds (near-end high-order path) • **HP-UAS**—Unavailable seconds (near-end high-order path) • **HP-ES-FE**—Errored seconds (far-end high-order path) • **HP-SES-FE**—Severely errored seconds (far-end high-order path) • **HP-UAS-FE**—Unavailable seconds (far-end high-order path)	**extensive**

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Table 56: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Received SDH overhead **Transmitted SDH overhead**	Values of the received and transmitted SONET overhead: • **C2**—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • **F1**—Section user channel byte. This byte is set aside for the purposes of users. • **K1** and **K2**—These bytes are allocated for APS signaling for the protection of the multiplex section. • **J0**—Section trace. This byte is defined for STS-1 number 1of an STS-*N* signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • **S1**—Synchronization status. The S1 byte is located in the first STS-1 of an STS-*N*. • **Z3** and **Z4**—Allocated for future use.	**extensive**
Received path trace **Transmitted path trace**	Channelized OC12 interfaces allow path trace bytes to be sent inband across the SONET/SDH link. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits. This information is specific to each of the 12 channelized OC12 interfaces.	**extensive**
DS3 media	Counts of T3 media-specific errors. For detailed definitions of the T3 (DS-3) error events (BPV, EXZ, LCV, PCV, and CCV) and performance parameters (LES, PES, PSES, CES, CSES, SEFS, and UAS), see RFC 2496. The DS3 or E3 media-specific error types can be: • **PLL Lock**—Phase-locked loop out of lock • **Reframing**—Frame alignment recovery time • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **IDLE**—Idle code detected • **YELLOW**—Errors at the remote site receiver • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—(DS3 only) Pulse code violation • **CCV**—(DS3 only) C-bit coding violation • **FEBE**—(DS3 only) Far-end block error • **LES**—Line error seconds • **PES**—(DS3 only) P-bit errored seconds • **PSES**—(DS3 only) P-bit errored seconds (section) • **CES**—(DS3 only) C-bit errored seconds • **CSES**—(DS3 only) C-bit severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**

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Table 56: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Line encoding**—Line encoding used. It is always **HDB3**. • **Byte encoding**—(T1 only) Byte encoding used: **Nx64K** or **Nx56K**. • **Line encoding**—Line encoding used. For T1, the value can be **B8ZS** or **AMI**. For E1, the value is **HDB3**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**. • **Idle cycle flag**—Idle cycle flags. • **Start end flag**—Start and end flag.	**extensive**
Interface transmit queues	Name of the transmit queues and their associated statistics for each DS3 channel on the Channelized OC12 PIC. • **B/W**—Queue bandwidth as a percentage of the total interface bandwidth. • **WRR**—Weighted round-robin (in percent). • **Packets**—Number of packets transmitted. • **Bytes**—Number of bytes transmitted. • **Drops**—Number of packets dropped. • **Errors**—Number of packet errors.	**extensive**
DSU configuration	Information about the DSU configuration. The last three lines (**Bit count**, **Error bit count**, and **LOS information**) are displayed only if a BERT has ever been run on the interface. • **Compatibility mode**—CSU/DSU compatibility mode: **None**, **Larscom**, **Kentrox**, or **Digital-Link**. • **Scrambling**—Payload scrambling. It can be **Enabled** or **Disabled**. • **Subrate**—Configured subrate setting. Applies only when**Digital-Link** compatibility mode is used. It can be **Disabled** or display units in kbps. • **FEAC loopback**—(T3) Whether a far-end alarm and control (FEAC) loopback is **Active** or **Inactive**. This feature is used to send alarm or status information from the far-end terminal back to the near-end terminal and to initiate T3 loopbacks at the far-end terminal from the near-end terminal. • **Response**—Whether the FEAC signal is **Enabled** or **Disabled**. • **Count**—Number of FEAC loopbacks.	**extensive**
BERT configuration	(DS interfaces) BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none

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Table 56: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Traffic statistics	Total number of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize. • **Input rate**—Rate of bits and packets received on the interface. • **Output rate**—Rate of bits and packets transmitted on the interface.	**detail extensive**
Local statistics	Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**

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Table 56: Channelized OC show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Transit statistics	Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, or **mpls**.	**detail extensive** none
Multilink bundle	(If the logical interface is configured as part of a multilink bundle.) Interface name for the multilink bundle.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces extensive (Channelized OC3 IQ) (Physical)

```
user@host> show interfaces extensive coc3-0/0/0
Physical interface: coc3-0/0/0, Enabled, Physical link is Down
  Interface index: 128, SNMP ifIndex: 22, Generation: 11
  Description: pink coc3-0/0/0
```

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```
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: OC3,
  Loopback: None, Parent: None
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2005-01-27 16:39:21 PST (1w0d 22:09 ago)
  Statistics last cleared: Never
  SONET alarms   : PLL, LOS
  SONET defects  : PLL, LOF, LOS, SEF, AIS-L
  SONET PHY:            Seconds        Count  State
    PLL Lock             681767            1  PLL Lock Error
    PHY Light                 0            0  OK
  SONET section:
    BIP-B1                    0            0
    SEF                  681767            1  Defect Active
    LOS                  681767            1  Defect Active
    LOF                  681767            1  Defect Active
    ES-S                 681767
    SES-S                681767
    SEFS-S               681767
  SONET line:
    BIP-B2                    0            0
    REI-L                     0            0
    RDI-L                     0            0  OK
    AIS-L                681767            1  Defect Active
    BERR-SF                   0            0  OK
    BERR-SD                   0            0  OK
    ES-L                 681767
    SES-L                681767
    UAS-L                681757
    ES-LFE                    0
    SES-LFE                   0
    UAS-LFE                   0
  Received SONET overhead:
    F1      : 0x00, J0      : 0x00, K1      : 0xff, K2      : 0xff
    S1      : 0xff
  Transmitted SONET overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00
```

show interfaces extensive (Channelized OC1 on Channelized OC3 IQ)

```
user@host> show interfaces extensive coc1-0/0/0:1
Physical interface: coc1-0/0/0:1, Enabled, Physical link is Down
  Interface index: 133, SNMP ifIndex: 27, Generation: 16
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: 51840kbps,

   Loopback: None, Parent: coc3-0/0/0
 Interface index 128
  Device flags   : Present Running Down 16384
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2005-02-04 14:51:07 PST (00:00:35 ago)
  Statistics last cleared: Never
  SONET alarms   : None
  SONET defects  : AIS-P
  SONET path:
```


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```
    BIP-B3                    0            0
    REI-P                     0            0
    LOP-P                     0            0  OK
    AIS-P                    36            1  Defect Active
    RDI-P                     0            0  OK
    UNEQ-P                    0            0  OK
    PLM-P                     0            0  OK
    ES-P                     36
    SES-P                    36
    UAS-P                    26
    ES-PFE                    0
    SES-PFE                   0
    UAS-PFE                   0
  Received SONET overhead:
    C2      : 0xff, C2(cmp) : 0x01, F2      : 0x00, Z3      : 0x00
    Z4      : 0x00, S1(cmp) : 0x00
  Transmitted SONET overhead:
    C2      : 0x01, F2      : 0x00, Z3      : 0x00, Z4      : 0x00
  Received path trace:
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
  Transmitted path trace: router-1 coc1-0/0/0:1
    6b 61 76 65 72 69 20 63 6f 63 31 2d 30 2f 30 2f   router-1 coc1-0/0/0:1
    30 3a 31 00 00 00 00 00 00 00 00 00 00 00 00 00   ..............
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
```

show interfaces extensive (Channelized T1 on Channelized OC3 IQ)

```
user@host> show interfaces extensive ct1-0/0/0:1:1
Physical interface: ct1-0/0/0:1:1, Enabled, Physical link is Down
  Interface index: 134, SNMP ifIndex: 62, Generation: 17
  Link-level type: Controller, Clocking: Internal, Speed: T1, Loopback: None,
  Framing: ESF, Parent: coc1-0/0/0:1 Interface index 133
  Device flags   : Present Running Down 16384
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : 2005-02-04 14:54:35 PST (00:00:18 ago)
  Statistics last cleared: Never
  DS1   alarms   : None
  DS1   defects  : AIS, LOF
  T1  media:            Seconds        Count  State
    SEF                       1            1  OK
    BEE                       1            1  OK
    AIS                      18            1  Defect Active
    LOF                      18            1  Defect Active
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CS                        0            0
    LES                      18
    ES                       18
```

```
    SES                     18
    SEFS                    18
    BES                      0
    UAS                     14
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  SONET alarms    : None
  SONET defects   : None
  SONET vt:
    BIP-BIP2                 0           0
    REI-V                    0           0
    LOP-V                    0           0  OK
    AIS-V                   19           1  Defect Active
    RDI-V                   19           1  Defect Active
    UNEQ-V                   0           0  OK
    PLM-V                   19           1  Defect Active
    ES-V                    19
    SES-V                   19
    UAS-V                    9
    ES-VFE                   0
    SES-VFE                  0
    UAS-VFE                  0
  Received SONET overhead:
    V5      : 0x07, V5(cmp) : 0x02
  Transmitted SONET overhead:
    V5      : 0x02
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
```

show interfaces extensive (DS0 on Channelized OC3 IQ)

```
user@host> show interfaces extensive ds-0/0/0:1:1:1
Physical interface: ds-0/0/0:1:1:1, Enabled, Physical link is Down
  Interface index: 135, SNMP ifIndex: 63, Generation: 18
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 320kbps,
  Loopback: None, FCS: 16, Parent: ct1-0/0/0:1:1  Interface index 134
  Device flags   : Present Running
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 4 supported
  Last flapped   : Never
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                    0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runs: 0, Giants: 0,
    Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, HS link CRC errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
     Resource errors: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                    0                    0

    1 expedited-fo                  0                    0                    0
```


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```
  2 assured-forw                  0                    0                    0

  3 network-cont                  0                    0                    0

HDLC configuration:
  Giant threshold: 1514, Runt threshold: 2
  Timeslots      : 1-5
  Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
  Start end flag: shared
DS0 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 4 (0x00)
```

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show interfaces (Channelized OC48 IQ and IQE)

Syntax show interfaces coc48-*fpc/pic/port*:*channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 12.3.

Description Display status information about the specified channelized OC48 interface.

Options

coc48-*fpc/pic/port*:*channel*—Display standard information about the specified channelized OC48 interface as shown in the sample output.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output show interfaces extensive (Channelized OC48 IQ) on page 748

Output Fields See the output field table for the show interfaces (Channelized OC3 IQ and IQE) command.

Sample Output

show interfaces extensive (Channelized OC48 IQ)

```
user@host> show interfaces coc48-4/1/0 extensive
Physical interface: coc48-4/1/0, Enabled, Physical link is Up
  Interface index: 138, SNMP ifIndex: 550, Generation: 141
  Link-level type: Controller, Clocking: Internal, SONET mode, Speed: OC48,
Loopback: None, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2012-07-10 01:55:53 PDT (00:50:07 ago)
  Statistics last cleared: Never
  Interface preservation: disabled
  SONET alarms   : None
  SONET defects  : None
  SONET PHY:            Seconds        Count  State
```


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```
  PLL Lock                    0            0  OK
  PHY Light                   0            0  OK
SONET section:
  BIP-B1                      0            0
  SEF                         0            0  OK
  LOS                         0            0  OK
  LOF                         0            0  OK
  ES-S                        0
  SES-S                       0
  SEFS-S                      0
SONET line:
  BIP-B2                      0            0
  REI-L                       0            0
  RDI-L                       0            0  OK
  AIS-L                       0            0  OK
  BERR-SF                     0            0  OK
  BERR-SD                     0            0  OK
  ES-L                        0
  SES-L                       0
  UAS-L                       0
  ES-LFE                      0
  SES-LFE                     0
  UAS-LFE                     0
Received SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00
```

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show interfaces (Channelized STM1 IQ)

Syntax show interfaces (*type-fpc/pic /port* <:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information about the specified channelized STM1 IQ interface.

Options ***type-fpc/pic/port*:*channel*:*channel***—Interface type with optional corresponding channel levels. The interface type can be one of the following types:

- ***type-fpc/pic/port*:*channel***—For the physical channelized STM1 IQ interface, ***type*** is **cstm1.** For the clear channel, ***type*** is **so**. For channelization, the STM1 IQ interface must be converted to interface type **cau4**.
- ***type-fpc/pic/port*:*channel***—At the first level of channelization, ***type*** can be **ce1** or **e1 (** clear channel or fractional channel from **cau4)**.
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** is **ds** (from **ce1**).

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output
show interfaces (Channelized STM1 IQ) (Physical) on page 750
show interfaces (Channelized AU-4) (Physical) on page 751
show interfaces (Channelized E1) (Physical) on page 751
show interfaces (DS) on page 752

Output Fields See the output field table for the show interfaces (Channelized STM1) command.

Sample Output

show interfaces (Channelized STM1 IQ) (Physical)

```
user@host> show interfaces cstm1-0/0/0
```


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```
Physical interface: cstm1-0/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 35
  Link-level type: Frame-relay, Controller, Clocking: Internal, SDH mode,
  Speed: OC3, Loopback: None, Parent: None  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
  Last flapped   : 2003-02-06 15:01:56 PST (07:15:06 ago)
...
```

show interfaces (Channelized AU-4) (Physical)

```
user@host> show interfaces cau4-0/0/0
Physical interface: cau4-0/0/0, Enabled, Physical link is Up
  Interface index: 147, SNMP ifIndex: 36
  Link-level type: Controller, Clocking: Internal, SDH mode, Speed: OC3,
  Loopback: None, Parent: cstm1-0/0/0 Interface index 146
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
  Last flapped   : 2003-02-06 19:36:31 PST (02:40:42 ago)
  SDH   alarms   : None
  SDH   defects  : None
...
```

show interfaces (Channelized E1) (Physical)

```
user@host> show interfaces ce1-0/0/0:11
Physical interface: ce1-0/0/0:11, Enabled, Physical link is Up
  Interface index: 169, SNMP ifIndex: 288
  Link-level type: Frame-relay, Controller, Clocking: Internal, Speed: E1,
  Loopback: None, Framing: G704, Parent: cau4-0/0/0 Interface index 147
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
```

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```
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
  Last flapped   : 2003-02-06 22:05:23 PST (00:13:45 ago)
  DS1   alarms   : None
  DS1   defects  : None
  SDH   alarms   : None
  SDH   defects  : None
...
```

show interfaces (DS)

```
user@host> show interfaces ds-0/0/0:11:1
Physical interface: ds-0/0/0:11:1, Enabled, Physical link is Up
  Interface index: 170, SNMP ifIndex: 289
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: Illegal, FCS: 16, Parent: ce1-0/0/0:11 Interface index 169
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  CoS Queues: 8 maximum usable queues, 4 in use
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Conf-req-sent
  Egress queues: 8 supported, 4 in use
...
  Logical interface ds-0/0/0:11:1.0 (Index 77) (SNMP ifIndex 290)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Bandwidth: 0
    Protocol inet, MTU: 1500
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.134.1.0/30, Local: 10.134.1.1
DLCI 100
      Flags: Active, Dce-configured
      Total down time: 0 sec, Last down: Never
      Traffic statistics:
       Input  bytes  :                   0
       Output bytes  :                   0
       Input  packets:                   0
       Output packets:                   0
...
```


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show interfaces (Channelized STM1)

Syntax
show interfaces e1-*fpc/pic/port*:*e1channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information
Command introduced before Junos OS Release 7.4.

Description
(M Series and T Series routers only) Display status information about the specified channelized STM1 interface.

Options
e1-*fpc/pic/port*:*e1channel*—Display standard status information about the specified channelized STM1 interface.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level
view

List of Sample Output
show interfaces extensive (Channelized STM1, SDH) on page 764

Output Fields
Table 44 on page 536 lists the output fields for the **show interfaces** (all Channelized STM1 interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 57: Channelized STM1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

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Table 57: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used on the link. It can be **G704**, **G704-NO-CRC4**, or **Unframed**. The default is **G704**.	All levels
Parent	(Channelized STM1 IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **interval***seconds*—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is**1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 57: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	(PPP and HDLC) Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

ANSI LMI settingsor **ITU LMI settings**	(Frame Relay) Local Management Interface settings. The format is **(ANSI or ITU) LMI settings:** ***value*****,** ***value*****...** ***xx*** seconds, where ***value*** can be: • **n391dte**—DTE full status polling interval (1- 255) • **n392dce**—DCE error threshold (1-10) • **n392dte**—DTE error threshold (1-10) • **n393dce**—DCE monitored event count (1-10) • **n393dte**—DTE monitored event count (1-10) • **t391dte**—DTE polling timer (5-30 seconds) • **t392dce**—DCE polling verification timer (5-30 seconds)	**detail extensive** none
LMI	(Frame Relay) Statistics about the link management. • **Input**—Number of packets coming in on the interface (***nn***) and how much time has passed since the last packet arrived. The format is **Input:** ***nn*** **(last seen** ***hh:mm:ss*** **ago)**. • **Output**—Number of packets sent out on the interface (***nn***) and how much time has passed since the last packet was sent. The format is **Output:** ***nn*** **(last seen** ***hh:mm:ss*** **ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 57: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay, displayed only from the DTE) Number of DLCIs configured from the DCE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none

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Table 57: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value of this field increments, the PIC is malfunctioning.	**extensive**

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Table 57: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware.	**extensive**
DS1 alarms **DS1 defects**	E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see *Bellcore Telcordia GR-499-CORE*. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none
SDH alarms **SDH defects**	SDH media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SDH PHY, SDH regenerator section, SDH multiplex section, and SDH path. NOTE: For controller-based SONET PICs, the SDH alarms and SDH defects output in the **show interface cstm1 extensive** command output only shows the section and line level defects. The path level defects can be found under the SONET (so) interface output.	All levels

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Table 57: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
E1 media	Active alarms and defects, plus counts of specific E1 errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Error types can be: • **AIS**—Alarm indication signal • **BEE**—Bit error • **BES**—Bit error seconds • **BPV**—Bipolar violation • **CS**—Carrier state • **ES**—Errored seconds • **EXZ**—Excessive zeros • **FEBE**—Far-end block error • **LCV**—Line code violation • **LES**—Line error seconds • **LOF**—Loss of frame • **LOS**—Loss of signal • **PCV**—Pulse code violation • **SEF**—Severely errored framing • **SEFS-S**—Severely errored framing seconds (section) • **SES**—Severely errored seconds • **UAS**—Unavailable seconds • **YELLOW**—Errors at the remote site receiver	**extensive**
Interface transmit queues	Names of the transmit queues and their associated statistics for each E1 channel on the Channelized STM1-to-E1 PIC. • **B/W**—Queue bandwidth as a percentage of the total interface bandwidth. • **WRR**—Weighted round-robin (in percent). • **Packets**—Number of packets transmitted. • **Bytes**—Number of bytes transmitted. • **Drops**—Number of packets dropped. • **Errors**—Number of packet errors.	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Line encoding**—Line encoding used. It is always **HDB3**.	**extensive**

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Table 57: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS1 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
SDH PHY	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **PLL Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**
SDH regenerator section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **RS-BIP8**—24-bit BIP for multiplex section overhead (B2 bytes) • **OOF**—Out of frame • **LOS**—Loss of signal • **LOF**—Loss of frame • **RS-ES**—Errored seconds (near-end regenerator section) • **RS-SES**—Severely errored seconds (near-end regenerator section) • **RS-SEFS**—Severely errored framing seconds (regenerator section)	**extensive**

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Table 57: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SDH multiplex section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **MS-BIP24**—8-bit BIP for high-order path overhead (B3 byte) • **MS-FEBE**—Far-end block error (multiplex section) • **MS-FERF**—Far-end remote fail (multiplex section) • **MS-AIS**—alarm indication signal (multiplex section) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **MS-ES**—Errored seconds (near-end multiplex section) • **MS-SES**—Severely errored seconds (near-end multiplex section) • **MS-UAS**—Unavailable seconds (near-end multiplex section) • **MS-ES-FE**—Errored seconds (far-end multiplex section) • **MS-SES-FE**—Severely errored seconds (far-end multiplex section) • **MS-UAS-FE**—Unavailable seconds (far-end multiplex section)	**extensive**
SDH path	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **HP-BIP8**—8-bit BIP for regenerator section overhead (B1 byte) • **HP-FEBE**—Far-end block error (high-order path) • **HP-LOP**—Loss of pointer (high-order path) • **HP-AIS**—High-order-path alarm indication signal • **HP-FERF**—Far-end remote fail (high-order path) • **HP-UNEQ**—Unequipped (high-order path) • **HP-PLM**—Payload label mismatch (high-order path) • **HP-ES**—Errored seconds (near-end high-order path) • **HP-SES**—Severely errored seconds (near-end high-order path) • **HP-UAS**—Unavailable seconds (near-end high-order path) • **HP-ES-FE**—Errored seconds (far-end high-order path) • **HP-SES-FE**—Severely errored seconds (far-end high-order path) • **HP-UAS-FE**—Unavailable seconds (far-end high-order path)	**extensive**

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Table 57: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SDH tu	Active alarms and defects, plus counts of specific SDH tributary unit (TU) errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **TU-BIP-2**—Bit interleaved parity for SONET line overhead • **TU-FEBE**—(near-end TU) • **TU-LOP**—Loss of pointer (near-end TU) • **TU-AIS**—Alarm indication signal (near-end TU) • **TU-FERF**—(near-end TU) • **TU-UNEQ**—Unequipped (near-end TU) • **TU-PLM**—Payload label mismatch (near-end TU) • **TU-ES**—Errored seconds (near-end TU) • **TU-SES**—Severely errored seconds (near-end TU) • **TU-UAS**—Unavailable seconds (near-end TU) • **TU-ES-FE**—Errored seconds (far-end TU) • **TU-SES-FE**—Severely errored seconds (far-end TU) • **TU-UAS-FE**—Unavailable seconds (far-end TU)	**extensive**
Received SDH overhead **Transmitted SDH overhead**	Values of the received and transmitted SONET overhead: • **C2**—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • **F1**—Section user channel byte. This byte is set aside for the purposes of users. • **K1** and **K2**—These bytes are allocated for APS signaling for the protection of the multiplex section. • **J0**—Section trace. This byte is defined for STS-1 number 1 of an STS-*N* signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • **S1**—Synchronization status. The S1 byte is located in the first STS-1 of an STS-*N* signal. • **Z3** and **Z4**—Allocated for future use.	**extensive**
Received path trace **Transmitted path trace**	Channelized OC12 interfaces allow path trace bytes to be sent inband across the SONET/SDH link. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits. This information is specific to each of the 12 channelized OC12 interfaces.	**extensive**
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**

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Table 57: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, or **mpls**.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none

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Table 57: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces extensive (Channelized STM1, SDH)

```
user@host> show interfaces e1-1/0/0:1 extensive
Physical interface: e1-1/0/0:1, Enabled, Physical link is Up
  Interface index: 148, SNMP ifIndex: 285, Generation: 2915
  Link-level type: Frame-relay, MTU: 1504, SDH mode, Speed: E1, Loopback: None,
  FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
  Hold-times     : Up 0 ms, Down 0 ms
```


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```
Last flapped   : 2002-05-23 17:02:59 PDT (17:23:45 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                  592                   48 bps
 Output bytes  :                  644                   48 bps
 Input  packets:                   46                    0 pps
 Output packets:                   46                    0 pps
Input errors:
  Errors: 0, Drops: 9, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 11, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
DS1   alarms   : None
DS1   defects  : None
SDH   alarms   : None
SDH   defects  : None
E1  media:            Seconds        Count  State
  SEF                       0            0  OK
  BEE                       0            0  OK
  AIS                     124            1  OK
  LOF                     124            1  OK
  LOS                       0            0  OK
  YELLOW                    0            0  OK
  BPV                       0            0
  EXZ                       0            0
  LCV                       0            0
  PCV                       0            0
  CS                        0            0
  FEBE                      0            0
  LES                     124
  ES                      125
  SES                     124
  SEFS                    124
  BES                       0
  UAS                      37
Interface transmit queues:
            B/W  WRR       Packets        Bytes        Drops       Errors
  Queue0     95   95             0            0            0            0
  Queue1      5    5           529         6348            0            0
HDLC configuration:
  Giant threshold: 0, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
SDH PHY:              Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                 0            0  OK
SDH regenerator section:
  RS-BIP8                   0            0
  OOF                     125            1  OK
  LOS                     125            1  OK
  LOF                     125            1  OK
  RS-ES                   125
  RS-SES                  125
  RS-SEFS                 125
SDH multiplex section:
  MS-BIP24                  0            0
  MS-FEBE                   0            0
```

```
  MS-FERF                   0            0  OK
  MS-AIS                  125            1  OK
  BERR-SF                   0            0  OK
  BERR-SD                   0            0  OK
  MS-ES                   125
  MS-SES                  125
  MS-UAS                  115
  MS-ES-FE                  0
  MS-SES-FE                 0
  MS-UAS-FE                 0
SDH path:
  HP-BIP8                   0            0
  HP-FEBE                   0            0
  HP-LOP                    0            0  OK
  HP-AIS                  125            1  OK
  HP-FERF                   0            0  OK
  HP-UNEQ                   0            0  OK
  HP-PLM                  125            1  OK
  HP-ES                   125
  HP-SES                  125
  HP-UAS                  115
  HP-ES-FE                  0
  HP-SES-FE                 0
  HP-UAS-FE                 0
SDH tu:
  TU-BIP2                   0            0
  TU-FEBE                 124            1
  TU-LOP                    0            0  OK
  TU-AIS                  124            1  OK
  TU-FERF                 124            1  OK
  TU-UNEQ                   0            0  OK
  TU-PLM                  124            1  OK
  TU-ES                   125
  TU-SES                  125
  TU-UAS                  115
  TU-ES-FE                  0
  TU-SES-FE                 0
  TU-UAS-FE                 0
Received SDH overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x02, C2(cmp) : 0x02, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00, V5      : 0x02
  V5(cmp) : 0x02
Transmitted SDH overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x02, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00, V5      : 0x02
Received path trace:
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
Transmitted path trace:
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 2 (0x07)
CoS information:
  CoS transmit queue              Bandwidth           Buffer Priority   Limit
                             %          bps   %         usec
  0 best-effort             95      1945600  95            0      low    none
  3 network-control          5       102400   5            0      low    none
Logical interface e1-1/0/0:1.0 (Index 10) (SNMP ifIndex 369) (Generation 496)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 575, Route table: 0
```


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```
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 19.19.19.3, Local: 19.19.19.4, Broadcast: Unspecified,
      Generation: 975
  DLCI 100
    Flags: Active, Dce-configured
    Total down time: 0 sec, Last down: Never
    Traffic statistics:
     Input  bytes  :                  0
     Output bytes  :                  0
     Input  packets:                  0
     Output packets:                  0
DLCI statistics:
  Active DLCI  :2 Inactive DLCI  : 0
```

show interfaces (Channelized T1 IQ)

Syntax show interfaces (ct1-*fpc/pic/port* | *type-fpc/pic/port*<:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced in Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information about the specified channelized T1 IQ interface.

Options ***type-fpc/pic/port*:*channel***—Interface type. With optional corresponding channel levels, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized T1 IQ interface, ***type*** is **ct1.**
- ***type-fpc/pic/port*:*channel***—For the clear channel, ***type*** is **t1**. At the first level of channelization, ***type*** can be **ct1** or **t1.**
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ds**.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output
show interfaces extensive (CT1) on page 776
show interfaces extensive (T1) on page 777
show interfaces extensive (DS0) on page 778

Output Fields Table 45 on page 551 lists the output fields for the **show interfaces** (Channelized T1 IQ and T3 IQ interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 58: Channelized T1 IQ and T3 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels

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Table 58: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used on the link. It can be **ESF** or **SF**. The default is **ESF**.	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	Configured settings for keepalives. • **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 58: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

LMI settings	(Frame Relay) Settings for Local Management Interface (LMI) can be either **ANSI LMI settings** or **ITU LMI settings**. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx seconds***, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) LMI packet statistics: • **Input**—Number of packets coming in on the interface (***nn***) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)**. • **Output**—Number of packets sent out on the interface (***nn***) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh:mm:ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communication equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 58: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the**Success** state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none

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Table 58: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS queues	Number of CoS queues configured.	**detail extensive** none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface. • **Input packets, Output packets**—Number of packets received and transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Giants**—Number of frames received that are larger than the giant threshold. • **Runts**—Number of frames received that are smaller than the runt threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Counter increments when the software could not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 58: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets whose size exceeds the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
DS1 alarms DS1 defects	Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 58: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
T1 media	Counts of T1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 media-specific error types can be: • **AIS**—Alarm indication signal • **BEE**—Bit error event • **BES**—Bit error seconds • **BPV**—Bipolar violation • **CS**—Carrier state • **ES**—Errored seconds • **EXZ**—Excessive zeros • **FEBE**—Far-end block error • **LCV**—Line code violation • **LES**—Line error seconds • **LOF**—Loss of frame • **LOS**—Loss of signal • **PCV**—Pulse code violation • **SEF**—Severely errored framing • **SEFS**—Severely errored framing seconds (section) • **SES**—Severely errored seconds • **UAS**—Unavailable seconds • **YELLOW**—Errors at the remote site receiver	**extensive**
Line encoding	Line encoding used: **B8ZS** or **AMI**.	All levels
Buildout	Buildout setting.	All levels
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Line encoding**—Line encoding used: **B8ZS** or **AMI**. • **Byte encoding**—Byte encoding used: **Nx64K** or **Nx56K**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**. • **Idle cycle Flag**—Idle cycle flags. • **Start end Flag**—Start and end flag.	**extensive**

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Table 58: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS0 or DS1 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface; values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	**All levels**
Encapsulation	Encapsulation on the logical interface.	**All levels**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, or **mpls**.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none

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Table 58: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces extensive (CT1)

```
user@host> show interfaces extensive ct1-0/1/1
Physical interface: ct1-0/1/1, Enabled, Physical link is Up
   Interface index: 145, SNMP ifIndex: 32, Generation: 28
   Link-level type: Controller, Clocking: Internal, Speed: T1,
   Loopback: None, Framing: ESF, Parent: None
 Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps 16384
   Link flags     : None
   Hold-times     : Up 0 ms, Down 0 ms
   CoS queues     : 4 supported
   Last flapped   : 2005-08-17 11:47:09 PDT (1d 03:38 ago)
   Statistics last cleared: 2005-08-18 15:25:37 PDT (00:00:27 ago)
   DS1   alarms   : None
   DS1   defects  : None
   T1  media:            Seconds        Count  State
     SEF                       0            0  OK
     BEE                       0            0  OK
     AIS                       0            0  OK
     LOF                       0            0  OK
     LOS                       0            0  OK
     YELLOW                    0            0  OK
     BPV                       0            0
     EXZ                       0            0
     LCV                       0            0
     PCV                       0            0
     CS                        0            0
     LES                       0
     ES                        0
     SES                       0
     SEFS                      0
     BES                       0
```


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```
    UAS                      0
    Line encoding: B8ZS
    Buildout       : 0 to 132 feet
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
```

show interfaces extensive (T1)

```
user@host> show interfaces extensive t1-0/2/0
Physical interface: t1-0/2/0, Enabled, Physical link is Up
   Interface index: 161, SNMP ifIndex: 33, Generation: 61
   Link-level type: PPP, MTU: 1504, Speed: T1, Loopback: None, FCS: 16,
   Parent: ct1-0/2/0 Interface index 148
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps 16384
   Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
   Hold-times     : Up 0 ms, Down 0 ms
   CoS queues     : 4 supported
   Last flapped   : 2005-09-07 15:43:47 PDT (00:00:06 ago)
   Statistics last cleared: Never
   Traffic statistics:
    Input  bytes  :                   0                   0 bps
    Output bytes  :                  14                   0 bps
    Input  packets:                   0                   0 pps
    Output packets:                   1                   0 pps
   Input errors:
     Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
     Policed discards: 0, L3 incompletes: 0,
     L2 channel errors: 0, L2 mismatch timeouts: 0,
     HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
   Output errors:
     Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0,
     MTU errors: 0, Resource errors: 0
   Queue counters:       Queued packets  Transmitted packets Dropped packets
     0 best-effort                    0                   0               0
     1 expedited-fo                   0                   0               0
     2 assured-forw                   0                   0               0
     3 network-cont                   1                   1               0
   DS1   alarms   : None
```

```
  DS1   defects  : None
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 1514, Runt threshold: 2
    Timeslots      : All active
    Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag:
    flags, Start end flag: shared
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)
```

show interfaces extensive (DS0)

```
user@host> show interfaces extensive ds-0/1/0:0
Physical interface: ds-0/1/0:1, Enabled, Physical link is Up
   Interface index: 157, SNMP ifIndex: 52, Generation: 46
   Link-level type: Frame-Relay, PPP, MTU: 1504, Clocking: Internal,
   Speed: 640kbps, Loopback: None, FCS:16,
   Parent: ct1-0/1/0 Interface index 143
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps 16384
   Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                     : 43186
    Full enquiries sent                : 8515
    Enquiry responses received         : 43185
    Full enquiry responses received    : 8515
  DCE statistics:
    Enquiries received                 : 0
    Full enquiries received            : 0
    Enquiry responses sent             : 0
    Full enquiry responses sent        : 0
  Common statistics:
    Unknown messages received          : 0
    Asynchronous updates received      : 0
    Out-of-sequence packets received   : 0
    Keepalive responses timedout       : 0
  Nonmatching DCE-end DLCIs:
          2
   Hold-times     : Up 0 ms, Down 0 ms
   Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
   Keepalive statistics:
     Input : 8 (last seen 00:00:12 ago)
     Output: 8 (last sent 00:00:07 ago)
   LCP state: Opened
   NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
   mpls: Not-configured
   CHAP state: Not-configured
   CoS queues     : 4 supported
   Last flapped   : 2005-08-18 15:23:46 PDT (00:03:17 ago)
   Statistics last cleared: 2005-08-18 15:25:37 PDT (00:01:26 ago)
   Traffic statistics:
    Input  bytes  :                  840                    0 bps
    Output bytes  :                  912                    0 bps
    Input  packets:                   25                    0 pps
    Output packets:                   26                    0 pps
   Input errors:
     Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
     Policed discards: 0, L3 incompletes: 0,
```


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```
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0,
    MTU errors: 0, Resource errors: 0
  Queue counters:       Queued packets  Transmitted packets Dropped packets
    0 best-effort                    0                    0               0
    1 expedited-fo                   0                    0               0
    2 assured-forw                   0                    0               0
    3 network-cont                  26                   26               0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 2
    Timeslots      : 1-10
    Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
    Start end flag: shared
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)
Logical interface ds-0/1/0:1.0 (Index 67) (SNMP ifIndex 53) (Generation 11)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 26, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 11.11.11.0/30, Local: 11.11.11.2, Broadcast: 11.11.11.3,
        Generation: 39
   DLCI 100
     Flags: Active, Dce-configured
     Total down time: 0 sec, Last down: Never
     Traffic statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
 DLCI statistics:
   Active DLCI  :2 Inactive DLCI  : 0
...
```

show interfaces (Channelized T3 IQ)

Syntax

show interfaces (ct3-*fpc/pic/port* | *type-fpc/pic/port*<:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

(M Series and T Series routers only) Display status information about the specified channelized T3 IQ interface.

Options

type-fpc/pic/port*:*channel—Interface type. With optional corresponding channel levels, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized T3 IQ interface, ***type*** is **ct3**.
- ***type-fpc/pic/port*:*channel***—For the clear channel, ***type*** is **t3**. At the first level of channelization, ***type*** can be **ct1** or **t1**.
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** is **ds**.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces extensive (Channelized T3 IQ) (Physical) on page 781
show interfaces extensive (Channelized T1 on Channelized T3 IQ) on page 781
show interfaces extensive (DS0 on Channelized T3 IQ) on page 781

Output Fields

See the output field table for the show interfaces (Channelized T1 IQ) command.

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Sample Output

show interfaces extensive (Channelized T3 IQ) (Physical)

```
user@host> show interfaces extensive ct3-0/0/1
Physical interface: ct3-0/0/1, Enabled, Physical link is Up
  Interface index: 30, SNMP ifIndex: 317, Generation: 29
  Link-level type: Controller, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (Channelized T1 on Channelized T3 IQ)

```
user@host> show interfaces extensive ct1-0/0/1:2
Physical interface: ct1-0/0/1:2, Enabled, Physical link is Up
  Interface index: 175, SNMP ifIndex: 1505, Generation: 174
  Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF, Parent: ct3-0/0/1 (Index 32)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (DS0 on Channelized T3 IQ)

```
user@host> show interfaces extensive ds-0/0/1:2:1
Physical interface: ds-0/0/1:2:1, Enabled, Physical link is Up
  Interface index: 176, SNMP ifIndex: 1563, Generation: 175
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Parent: ct1-0/0/1:2(Index 175)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
...
```

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show interfaces (SONET/SDH)

Syntax

show interfaces so-*fpc/pic/port*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

(M Series and T Series routers only) Display status information about the specified SONET/SDH interface.

Options

so-*fpc/pic/port*—Display standard information about the specified SONET/SDH interface.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

Related Documentation

- *SONET/SDH Interfaces Overview*

List of Sample Output

show interfaces (SDH Mode, PPP) on page 795
show interfaces brief (SDH Mode, PPP) on page 796
show interfaces detail (SDH Mode, PPP) on page 796
show interfaces extensive (SDH Mode, PPP) on page 797
show interfaces brief (SONET Mode, Frame Relay) on page 799
show interfaces (SONET Mode, Frame Relay) on page 799
show interfaces detail (SONET Mode, Frame Relay) on page 800
show interfaces extensive (SONET Mode, Frame Relay) on page 802
show interfaces extensive (OC768-over-4xOC192 Mode) on page 804
show interfaces detail (IPv6 Tracking) on page 807
show interfaces (shared interface) on page 808

Output Fields

Table 59 on page 783 lists the output fields for the **show interfaces** (SONET/SDH) command. Output fields are listed in the approximate order in which they appear.

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Table 59: SONET/SDH show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	SONET/SDH reference clock source: **Internal** or **External**. Clocking is configured and displayed only for channel 0.	All levels
***Framing* mode**	Framing mode: **SONET** or **SDH**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Payload scrambler	Whether payload scrambling is enabled.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Shared-interface	Indicates whether the routing domain is the owner or non-owner of the shared interface. If the routing domain is the Root System Domain (RSD), the value is **Owner**. If the routing domain is a Protected System Domain (PSD) under the RSD, the value is **Non-owner**.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels

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Table 59: SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
ANSI or ITU LMI settings	(Frame Relay) Settings for Local Management Interface (LMI). The format is **(ANSI or ITU) LMI settings:** *value*, *value*... *xx* seconds, where *value* can be: • **n391dte**—DTE full status polling interval (1-255) • **n392dce**—DCE error threshold (1-10) • **n392dte**—DTE error threshold (1-10) • **n393dce**—DCE monitored event count (1-10) • **n393dte**—DTE monitored event count (1-10) • **t391dte**—DTE polling timer (5-30 seconds) • **t392dce**—DCE polling verification timer (5-30 seconds)	All levels
LMI	**Input:** *value* **(***hh:mm:ss* **ago), Output:** *value* **(***hh:mm:ss* **ago)**	**brief** none
LMI statistics	(Frame Relay) LMI packet statistics: • **Input**—Number of packets coming in on the interface (*nn*) and how much time has passed since the last packet arrived. The format is **Input:** ***nn*** **(last seen** ***hh:mm:ss*** **ago)**. • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output:** ***nn*** **(last sent** ***hh:mm:ss*** **ago)**.	**detail extensive**
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 59: SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE) Number of DLCIs configured from the DCE.	**detail extensive**
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	All levels

Keepalive or **Keepalive statistics**	(PPP and HDLC) Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		All levels

LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none

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Table 59: SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the **Success** state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
CoS queues	Number of CoS queues configured.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*****hour:minute:second*** **ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago).**	**detail extensive** none
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number of bytes and packets received and transmitted on the physical interface, and the traffic rate in bits per seconds (bps). • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**

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Table 59: SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Label-switched interface (LSI) traffic statistics	(Frame Relay) LSI traffic statistics: • **Input bytes**—Number of bytes and speed, in bits per second (bps), received on the interface. • **Output packets**—Number of packets and speed, in bps, transmitted on the interface.	**extensive**
Input errors	Input errors on the interface whose definitions are as follows: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **Giants**—Number of frames received that are larger than the giant threshold. • **Bucket Drops**—Drops resulting from the traffic load exceeding the interface transmit/receive leaky bucket configuration. The default is **off**. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **HS link FIFO overflows**—Number of FIFO overflows on the high-speed links between the ASICs responsible for handling the router interfaces.	**extensive**

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Table 59: SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **HS link FIFO underflows**—Number of FIFO underflows on the high-speed links between the ASICs responsible for handling the router interfaces. • **MTU errors**—Number of packets whose size exceeds the MTU of the interface.	**extensive**
IPv6 transit statistics	Number of transit bytes and packets received and transmitted on the physical interface if IPv6 statistics tracking is enabled. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Egress queues	Total number of egress queues supported on the specified interface.	**detail extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**extensive**
SONET alarms **SONET defects**	(SONET) SONET media-specific alarms and defects that prevents the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: **SONET PHY**, **SONET section**, **SONET line**, and **SONET path**.	All levels
Link	(For 4-port OC192c PIC operating in OC768-over-4xOC192 mode) The link number. Errors and alarms are displayed for each link.	**extensive**

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Table 59: SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SONET PHY	Counts of specific SONET errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **PLL Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**
SONET section	Counts of specific SONET errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B1**—Bit interleaved parity for SONET section overhead • **SEF**—Severely errored framing • **LOL**—Loss of light • **LOF**—Loss of frame • **ES-S**—Errored seconds (section) • **SES-S**—Severely errored seconds (section) • **SEFS-S**—Severely errored framing seconds (section)	**extensive**
SONET line	Active alarms and defects, plus counts of specific SONET errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **BIP-B2**—Bit interleaved parity for SONET line overhead • **REI-L**—Remote error indication (near-end line) • **RDI-L**—Remote defect indication (near-end line) • **AIS-L**—Alarm indication signal (near-end line) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **ES-L**—Errored seconds (near-end line) • **SES-L**—Severely errored seconds (near-end line) • **UAS-L**—Unavailable seconds (near-end line) • **ES-LFE**—Errored seconds (far-end line) • **SES-LFE**—Severely errored seconds (far-end line) • **UAS-LFE**—Unavailable seconds (far-end line)	**extensive**

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Table 59: SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SONET path	Active alarms and defects, plus counts of specific SONET errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than**OK** indicates a problem. Subfields are: • **BIP-B3**—Bit interleaved parity for SONET section overhead • **REI-P**—Remote error indication • **LOP-P**—Loss of pointer (path) • **AIS-P**—Path alarm indication signal • **RDI-P**—Path remote defect indication • **UNEQ-P**—Path unequipped • **PLM-P**—Path payload (signal) label mismatch • **ES-P**—Errored seconds (near-end STS path) • **SES-P**—Severely errored seconds (near-end STS path) • **UAS-P**—Unavailable seconds (near-end STS path) • **ES-PFE**—Errored seconds (far-end STS path) • **SES-PFE**—Severely errored seconds (far-end STS path) • **UAS-PFE**—Unavailable seconds (far-end STS path)	**extensive**
Received SONET overhead **Transmitted SONET overhead**	Values of the received and transmitted SONET overhead: • **C2**—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • **F1**—Section user channel byte. This byte is set aside for the purposes of users. • **K1** and **K2**—These bytes are allocated for APS signaling for the protection of the multiplex section. • **J0**—Section trace. This byte is defined for STS-1 number 1 of an STS-*N* signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • **S1**—Synchronization status. The S1 byte is located in the first STS-1 of an STS-*N*. • **Z3** and **Z4**—Allocated for future use.	**extensive**
SDH alarms **SDH defects**	SDH media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: **SDH PHY**, **SDH regenerator section**, **SDH multiplex section**, and **SDH path**.	All levels

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Table 59: SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SDH PHY	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **PLL Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**
SDH regenerator section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **RS-BIP8**—24-bit BIP for multiplex section overhead (B2 bytes) • **OOF**—Out of frame • **LOS**—Loss of signal • **LOF**—Loss of frame • **RS-ES**—Errored seconds (near-end regenerator section) • **RS-SES**—Severely errored seconds (near-end regenerator section) • **RS-SEFS**—Severely errored framing seconds (regenerator section)	**extensive**
SDH multiplex section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **MS-BIP24**—8-bit BIP for high-order path overhead (B3 byte) • **MS-FEBE**—Far-end block error (multiplex section) • **MS-FERF**—Far-end remote fail (multiplex section) • **MS-AIS**—Alarm indication signal (multiplex section) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **MS-ES**—Errored seconds (near-end multiplex section) • **MS-SES**—Severely errored seconds (near-end multiplex section) • **MS-UAS**—Unavailable seconds (near-end multiplex section) • **MS-ES-FE**—Errored seconds (far-end multiplex section) • **MS-SES-FE**—Severely errored seconds (far-end multiplex section) • **MS-UAS-FE**—Unavailable seconds (far-end multiplex section)	**extensive**

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Table 59: SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SDH path	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **HP-BIP8**—8-bit BIP for regenerator section overhead (B1 byte) • **HP-FEBE**—Far-end block error (high-order path) • **HP-LOP**—Loss of pointer (high-order path) • **HP-AIS**—High-order-path alarm indication signal • **HP-FERF**—Far-end remote fail (high-order path) • **HP-UNEQ**—Unequipped (high-order path) • **HP-PLM**—Payload label mismatch (high-order path) • **HP-ES**—Errored seconds (near-end high-order path) • **HP-SES**—Severely errored seconds (near-end high-order path) • **HP-UAS**—Unavailable seconds (near-end high-order path) • **HP-ES-FE**—Errored seconds (far-end high-order path) • **HP-SES-FE**—Severely errored seconds (far-end high-order path) • **HP-UAS-FE**—Unavailable seconds (far-end high-order path)	**extensive**
Received SDH overhead **Transmitted SDH overhead**	Values of the received and transmitted SONET overhead: • **C2**—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • **F1**—Section user channel byte. This byte is set aside for the purposes of users. • **K1** and **K2**—These bytes are allocated for APS signaling for the protection of the multiplex section. • **J0**—Section trace. This byte is defined for STS-1 number 1 of an STS-*N* signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • **S1**—Synchronization status. The S1 byte is located in the first STS-1 of an STS-*N*. • **Z3** and **Z4**—Allocated for future use.	**extensive**
Received path trace **Transmitted path trace**	SONET/SDH interfaces allow path trace bytes to be sent inband across the SONET/SDH link. Juniper Networks and other router manufacturers use these bytes to help diagnose misconfigurations and network errors by setting the transmitted path trace message so that it contains the system hostname and name of the physical interface. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits.	**extensive**

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Table 59: SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware.	**extensive**
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
PPP parameters	The PPP loopback clear timer value.	**extensive**

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Table 59: SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Shared interface	Provides the following information: • **shared with**—(RSD only) Indicates which PSD owns the logical shared interface. For example, **psd3**. • **peer interface**—(PSD only) Lists the logical tunnel interface that peers with the logical shared interface. For example, **ut-2/1/0.2**. • **tunnel token**—Specifies the receive (RX) and transmit (TX) tunnel tokens. For example, **Rx: 5.519, Tx: 13.514**.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	Total number of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Local statistics	Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Transit statistics	Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, or **mpls**.	**detail extensive none**
protocol-family	Protocol family configured on the logical interface. If the protocol is **inet**, the IP address of the interface is also displayed.	**brief**
Multilink bundle	(If the logical interface is configured as part of a multilink bundle.) Interface name for the multilink bundle.	**detail extensive** none
AS bundle	(If the logical interface is configured as part of an aggregated SONET bundle.) AS bundle number.	**detail extensive**
MTU	MTU size on the logical interface.	**detail extensive none**
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under *Common Output Fields Description*.	**detail extensive** none

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Table 59: SONET/SDH show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address of the interface.	**detail extensive** none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive**
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces (SDH Mode, PPP)

```
user@host> show interfaces so-0/0/0
Physical interface: so-0/0/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 66
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SDH mode, Speed: OC3,
  Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 30 (00:00:07 ago), Output: 29 (00:00:05 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Closed
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : 2006-03-24 13:20:56 PST (00:05:09 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SDH   alarms   : None
  SDH   defects  : None

  Logical interface so-0/0/0.0 (Index 66) (SNMP ifIndex 43)
```

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```
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    Protocol inet, MTU: 4470
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.0.12.0/30, Local: 10.0.12.1, Broadcast: 10.0.12.3
    Protocol iso, MTU: 4470
      Flags: Protocol-Down
    Protocol mpls, MTU: 4458, Maximum labels: 3
      Flags: Protocol-Down, Is-Primary
```

show interfaces brief (SDH Mode, PPP)

```
user@host> show interfaces so-0/0/0 brief
Physical interface: so-0/0/0, Enabled, Physical link is Up
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SDH mode, Speed: OC3,
  Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 25 (00:00:01 ago), Output: 24 (00:00:04 ago)
  SDH   alarms   : None
  SDH   defects  : None

  Logical interface so-0/0/0.0
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    inet  10.0.12.1/30
    iso
    mpls
```

show interfaces detail (SDH Mode, PPP)

```
user@host> show interfaces so-0/0/0 detail
Physical interface: so-0/0/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 66, Generation: 35
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SDH mode, Speed: OC3,
  Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 33 (last seen 00:00:05 ago)
    Output: 32 (last sent 00:00:06 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Closed
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : 2006-03-24 13:20:56 PST (00:05:38 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                  862                    0 bps
   Output bytes  :                 3592                   64 bps
   Input  packets:                   70                    0 pps
   Output packets:                  330                    0 pps
  Egress queues: 4 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0
```


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```
  1 expedited-fo                 0                 0                 0

  2 assured-forw                 0                 0                 0

  3 network-cont               329               329                 0

SDH   alarms   : None
SDH   defects  : None

Logical interface so-0/0/0.0 (Index 66) (SNMP ifIndex 43) (Generation 19)
  Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
  Protocol inet, MTU: 4470, Generation: 48, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 10.0.12.0/30, Local: 10.0.12.1, Broadcast: 10.0.12.3,
      Generation: 48
  Protocol iso, MTU: 4470, Generation: 49, Route table: 0
    Flags: Protocol-Down
  Protocol mpls, MTU: 4458, Maximum labels: 3, Generation: 50, Route table: 0
    Flags: Protocol-Down, Is-Primary
```

show interfaces extensive (SDH Mode, PPP)

```
user@host> show interfaces so-0/0/0 extensive
Physical interface: so-0/0/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 66, Generation: 35
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SDH mode, Speed: OC3,
  Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 36 (last seen 00:00:01 ago)
    Output: 35 (last sent 00:00:10 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Closed
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : 2006-03-24 13:20:56 PST (00:06:08 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                  922                    0 bps
   Output bytes  :                 3850                   64 bps
   Input  packets:                   75                    0 pps
   Output packets:                  356                    0 pps
  Label-switched interface (LSI) traffic statistics:
   Input  bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Bucket drops: 0, Policed discards: 218, L3 incompletes: 0,
    L2 channel errors: 0, L2 mismatch timeouts: 2, HS link CRC errors: 0,
    HS link FIFO overflows: 0
  Output errors:
    Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0,
    HS link FIFO underflows: 0, MTU errors: 0
  Egress queues: 4 supported, 4 in use
```

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```
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort                    0                    0                    0

  1 expedited-fo                   0                    0                    0

  2 assured-forw                   0                    0                    0

  3 network-cont                 354                  354                    0

SDH   alarms   : None
SDH   defects  : None
SDH PHY:              Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                 2            1  OK
SDH regenerator section:
  RS-BIP8                   0            0
  OOF                       3            8  OK
  LOS                       3            2  OK
  LOF                       3            2  OK
  RS-ES                     3
  RS-SES                    3
  RS-SEFS                   3
SDH multiplex section:
  MS-BIP24                  0            0
  MS-FEBE                   0            0
  MS-FERF                   3            2  OK
  MS-AIS                    2            1  OK
  BERR-SF                   0            0  OK
  BERR-SD                   0            0  OK
  MS-ES                     3
  MS-SES                    3
  MS-UAS                    0
  MS-SES-FE                 3
  MS-UAS-FE                 0
SDH path:
  HP-BIP8                   0            0
  HP-FEBE                   0            0
  HP-LOP                    1            1  OK
  HP-AIS                    2            1  OK
  HP-FERF                   3            2  OK
  HP-UNEQ                   0            0  OK
  HP-PLM                    1            1  OK
  HP-ES                     3
  HP-SES                    3
  HP-UAS                    0
  HP-ES-FE                  3
  HP-SES-FE                 3
  HP-UAS-FE                 0
Received SDH overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0xcf, C2(cmp) : 0xcf, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SDH overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0xcf, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
Received path trace: R2 so-0/0/0
  52 32 20 73 6f 2d 30 2f 30 2f 30 00 00 00 00 00   R2 so-0/0/0.....
Transmitted path trace: R1 so-0/0/0
  52 31 20 73 6f 2d 30 2f 30 2f 30 00 00 00 00 00   R1 so-0/0/0.....
```


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```
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 4484, Runt threshold: 3
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 1 (0x00)
  CoS information:
    CoS transmit queue    Bandwidth      Buffer Priority   Limit
                        %        bps   %   usec
    0 best-effort      95  147744000  95      0      low    none
    3 network-control   5    7776000   5      0      low    none

  Logical interface so-0/0/0.0 (Index 66) (SNMP ifIndex 43) (Generation 19)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    PPP parameters:
      PPP loopback clear timer: 3 sec
    Protocol inet, MTU: 4470, Generation: 48, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.0.12.0/30, Local: 10.0.12.1, Broadcast: 10.0.12.3,
        Generation: 48
    Protocol iso, MTU: 4470, Generation: 49, Route table: 0
      Flags: Protocol-Down
    Protocol mpls, MTU: 4458, Maximum labels: 3, Generation: 50, Route table: 0
      Flags: Protocol-Down, Is-Primary
  MS-ES-FE                  3
```

show interfaces brief (SONET Mode, Frame Relay)

```
user@host> show interfaces so-0/0/0 brief
Physical interface: so-0/0/0, Enabled, Physical link is Up
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 29 (00:00:02 ago), Output: 28 (00:00:01 ago)
  SONET alarms   : None
  SONET defects  : None

  Logical interface so-0/0/0.0
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    inet  10.0.12.1        --> 10.0.12.2
    iso
    mpls
    DLCI 16
      Flags: Down, DCE-Unconfigured
      Total down time: 00:04:12 sec, Last down: 00:04:12 ago
```

show interfaces (SONET Mode, Frame Relay)

```
user@host> show interfaces so-0/0/0
Physical interface: so-0/0/0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 66
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
```

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```
  LMI: Input: 23 (00:00:05 ago), Output: 22 (00:00:03 ago)
  DTE statistics:
    Enquiries sent                       : 19
    Full enquiries sent                  : 3
    Enquiry responses received           : 20
    Full enquiry responses received      : 3
  DCE statistics:
    Enquiries received                   : 0
    Full enquiries received              : 0
    Enquiry responses sent               : 0
    Full enquiry responses sent          : 0
  Common statistics:
    Unknown messages received            : 0
    Asynchronous updates received        : 0
    Out-of-sequence packets received     : 0
    Keepalive responses timedout         : 1
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : 2006-03-06 11:53:20 PST (3d 03:09 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 56 bps (0 pps)
  SONET alarms   : None
  SONET defects  : None

  Logical interface so-0/0/0.0 (Index 79) (SNMP ifIndex 43)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Input packets : 0
    Output packets: 0
    Protocol inet, MTU: 4470
      Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.0.12.2, Local: 10.0.12.1
    Protocol iso, MTU: 4470
      Flags: None
    Protocol mpls, MTU: 4450, Maximum labels: 3
    DLCI 16
      Flags: Down, DCE-Unconfigured
      Total down time: 00:03:11 sec, Last down: 00:03:11 ago
        Input packets : 0
        Output packets: 0
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces detail (SONET Mode, Frame Relay)

```
user@host> show interfaces so-0/0/0 detail
Physical interface: so-0/0/0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 66, Generation: 11
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 33 (last seen 00:00:09 ago)
    Output: 32 (last sent 00:00:01 ago)
  DTE statistics:
    Enquiries sent                       : 27
    Full enquiries sent                  : 5
    Enquiry responses received           : 28
```


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```
  Full enquiry responses received      : 5
DCE statistics:
  Enquiries received                   : 0
  Full enquiries received              : 0
  Enquiry responses sent               : 0
  Full enquiry responses sent          : 0
Common statistics:
  Unknown messages received            : 0
  Asynchronous updates received        : 0
  Out-of-sequence packets received     : 0
  Keepalive responses timedout         : 1
CoS queues     : 4 supported, 4 maximum usable queues
Last flapped   : 2006-03-06 11:53:20 PST (3d 03:10 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :               495368                    0 bps
 Output bytes  :              2765014                   56 bps
 Input  packets:                41165                    0 pps
 Output packets:               133530                    0 pps
Egress queues: 4 supported, 4 in use
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort                   18                   18                    0

  1 expedited-fo                   0                    0                    0

  2 assured-forw                   0                    0                    0

  3 network-cont              133506               133506                    0

SONET alarms   : None
SONET defects  : None
Logical interface so-0/0/0.0 (Index 79) (SNMP ifIndex 43) (Generation 28)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Traffic statistics:
   Input  bytes  :                   0
   Output bytes  :                   0
   Input  packets:                   0
   Output packets:                   0
  Local statistics:
   Input  bytes  :                   0
   Output bytes  :                   0
   Input  packets:                   0
   Output packets:                   0
  Transit statistics:
   Input  bytes  :                   0                    0 bps
   Output bytes  :                   0                    0 bps
   Input  packets:                   0                    0 pps
   Output packets:                   0                    0 pps
  Protocol inet, MTU: 4470, Generation: 49, Route table: 0
    Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 10.0.12.2, Local: 10.0.12.1, Broadcast: Unspecified,
      Generation: 61
  Protocol iso, MTU: 4470, Generation: 50, Route table: 0
    Flags: None
  Protocol mpls, MTU: 4450, Maximum labels: 3, Generation: 51, Route table: 0
  DLCI 16
    Flags: Down, DCE-Unconfigured
    Total down time: 00:04:54 sec, Last down: 00:04:54 ago
    Traffic statistics:
```

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```
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces extensive (SONET Mode, Frame Relay)

```
user@host> show interfaces so-0/0/0 extensive
Physical interface: so-0/0/0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 66, Generation: 11
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: OC3, Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 39 (last seen 00:00:02 ago)
    Output: 36 (last sent 00:00:07 ago)
  DTE statistics:
    Enquiries sent                      : 30
    Full enquiries sent                 : 6
    Enquiry responses received          : 33
    Full enquiry responses received     : 6
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
    Keepalive responses timedout        : 1
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : 2006-03-06 11:53:20 PST (3d 03:11 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :              495452                  56 bps
   Output bytes  :             2765074                   0 bps
   Input  packets:               41171                   0 pps
   Output packets:              133534                   0 pps
  Label-switched interface (LSI) traffic statistics:
   Input  bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Bucket drops: 0, Policed discards: 0, L3 incompletes: 0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    HS link FIFO overflows: 0
  Output errors:
    Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0,
    HS link FIFO underflows: 0, MTU errors: 0
  Egress queues: 4 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                  18                  18                    0
```


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```
    1 expedited-fo                  0                    0                    0

    2 assured-forw                  0                    0                    0

    3 network-cont             133510               133510                    0

  SONET alarms   : None
  SONET defects  : None
  SONET PHY:            Seconds        Count  State
    PLL Lock                  0            0  OK
    PHY Light                60            1  OK
  SONET section:
    BIP-B1                    0            0
    SEF                     108          158  OK
    LOS                     108            2  OK
    LOF                     108            2  OK
    ES-S                    108
    SES-S                   108
    SEFS-S                  108
  SONET line:
    BIP-B2                    0            0
    REI-L                     0            0
    RDI-L                     1            1  OK
    AIS-L                   107            1  OK
    BERR-SF                   0            0  OK
    BERR-SD                  44            2  OK
    ES-L                    108
    SES-L                   108
    UAS-L                    97
    ES-LFE                    1
    SES-LFE                   1
    UAS-LFE                   0
SONET path:
    BIP-B3                    0            0
    REI-P                     0            0
    LOP-P                     1            1  OK
    AIS-P                   107            1  OK
    RDI-P                     1            1  OK
    UNEQ-P                    0            0  OK
    PLM-P                     1            1  OK
    ES-P                    108
    SES-P                   108
    UAS-P                    97
    ES-PFE                    1
    SES-PFE                   1
    UAS-PFE                   0
  Received SONET overhead:
    F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
    S1      : 0x00, C2      : 0xcf, C2(cmp) : 0xcf, F2      : 0x00
    Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
  Transmitted SONET overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00, C2      : 0xcf, F2      : 0x00, Z3      : 0x00
    Z4      : 0x00
  Received path trace: R2 so-0/0/0
    52 32 20 73 6f 2d 30 2f 30 2f 30 00 00 00 00 00   R2 so-0/0/0.....
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 0d 0a ................
  Transmitted path trace: R1 so-0/0/0
    52 31 20 73 6f 2d 30 2f 30 2f 30 00 00 00 00 00   R1 so-0/0/0.....
```

```
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 4484, Runt threshold: 3
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 1 (0x00)
  CoS information:
    CoS transmit queue        Bandwidth              Buffer  Priority   Limit
                          %           bps     %           usec
    0 best-effort        95     147744000    95              0       low    none
    3 network-control     5       7776000     5              0       low    none

  Logical interface so-0/0/0.0 (Index 79) (SNMP ifIndex 43) (Generation 28)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                    0 bps
     Output bytes  :                   0                    0 bps
     Input  packets:                   0                    0 pps
     Output packets:                   0                    0 pps
    Protocol inet, MTU: 4470, Generation: 49, Route table: 0
      Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.0.12.2, Local: 10.0.12.1, Broadcast: Unspecified,
        Generation: 61
    Protocol iso, MTU: 4470, Generation: 50, Route table: 0
      Flags: None
    Protocol mpls, MTU: 4450, Maximum labels: 3, Generation: 51, Route table: 0
    DLCI 16
      Flags: Down, DCE-Unconfigured
      Total down time: 00:05:42 sec, Last down: 00:05:42 ago
      Traffic statistics:
       Input  bytes  :                  0
       Output bytes  :                  0
       Input  packets:                  0
       Output packets:                  0
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces extensive (OC768-over-4xOC192 Mode)

```
user@host> show interfaces so-7/0/0 extensive
Physical interface: so-7/0/0, Enabled, Physical link is Up
  Interface index: 163, SNMP ifIndex: 23, Generation: 186
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal, SONET mode, Speed:
 OC768,
  Loopback: Local, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
```


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```
  Link flags     : No-Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2006-01-13 10:43:39 PST (01:05:33 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                76992                 200 bps
   Output bytes  :                83707                 216 bps
   Input  packets:                 1343                   0 pps
   Output packets:                 1343                   0 pps
  Input errors:
    Errors: 0, Drops: 3885, Framing errors: 68154624, Runts: 0, Giants: 0, Bucket
 drops: 0,
    Policed discards: 0, L3 incompletes: 95040248, L2 channel errors: 0, L2
mismatch timeouts: 0,
    HS link CRC errors: 0, HS link FIFO overflows: 30742070
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, HS link FIFO
underflows: 0,
    MTU errors: 0
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    2                    2                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                1341                 1341                    0

  SONET alarms   : None
  SONET defects  : None
  Link : 0
  SONET alarms   : None
  SONET defects  : None
  SONET PHY:            Seconds        Count  State
    PLL Lock                  0            0  OK
    PHY Light                 0            0  OK
  SONET section:
    BIP-B1                    0            0
    SEF                       2            1  OK
    LOS                       0            0  OK
    LOF                       3            2  OK
    ES-S                      2
    SES-S                     2
    SEFS-S                    2
  SONET line:
    BIP-B2                    0            0
    REI-L                     0            0
    RDI-L                     1            1  OK
    AIS-L                     2            1  OK
    BERR-SF                   0            0  OK
    BERR-SD                   0            0  OK
    ES-L                      3
    SES-L                     3
    UAS-L                     0
    ES-LFE                    1
    SES-LFE                   1
    UAS-LFE                   0
  SONET path:
```

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```
  BIP-B3                    0            0
  REI-P                     0            0
  LOP-P                     0            0  OK
  AIS-P                     2            1  OK
  RDI-P                     0            0  OK
  UNEQ-P                    0            0  OK
  PLM-P                     0            0  OK
  ES-P                      3
  SES-P                     3
  UAS-P                     0
  ES-PFE                    0
  SES-PFE                   0
  UAS-PFE                   0
Payload pointer:
  Current pointer             :  522
  Pointer increment count     :  0
  Pointer decrement count     :  0
  New pointer NDF count       :  0
Received SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0xcf, C2(cmp) : 0xcf, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
  F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0xcf, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00
Received path trace: fold so-7/0/0
  66 6f 6c 64 20 73 6f 2d 37 2f 30 2f 30 00 00 00   fold so-7/0/0...
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 0d 0a ................
Transmitted path trace: fold so-7/0/0
  66 6f 6c 64 20 73 6f 2d 37 2f 30 2f 30 00 00 00   fold so-7/0/0...
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
Link : 1
SONET alarms   : None
SONET defects  : None
SONET PHY:             Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                 0            0  OK
SONET section:
  BIP-B1                    0            0
  SEF                       2            1  OK
  LOS                       0            0  OK
  LOF                       3            2  OK
  ES-S                      2
  SES-S                     2
  SEFS-S                    2
SONET line:
  BIP-B2                    0            0
  REI-L                     0            0
  RDI-L                     0            0  OK
  AIS-L                     2            1  OK
  BERR-SF                   0            0  OK
  BERR-SD                   0            0  OK
  ES-L                      3
  SES-L                     3
  UAS-L                     0
  ES-LFE                    0
```


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```
    SES-LFE                  0
    UAS-LFE                  0
  SONET path:
    BIP-B3                   0           0
    REI-P                    0           0
    LOP-P                    0           0  OK
    AIS-P                    2           1  OK
    RDI-P                    0           0  OK
    UNEQ-P                   0           0  OK
    PLM-P                    0           0  OK
    ES-P                     3
    SES-P                    3
    UAS-P                    0
    ES-PFE                   0
    SES-PFE                  0
    UAS-PFE                  0
  Payload pointer:
    Current pointer            :  522
    Pointer increment count    :  0
    Pointer decrement count    :  0
    New pointer NDF count      :  0
  Received SONET overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00, C2      : 0xcf, C2(cmp) : 0xcf, F2      : 0x00
    Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00
  Transmitted SONET overhead:
    F1      : 0x00, J0      : 0x01, K1      : 0x00, K2      : 0x00
    S1      : 0x00, C2      : 0xcf, F2      : 0x00, Z3      : 0x00
    Z4      : 0x00
  Received path trace: fold so-7/0/0
    66 6f 6c 64 20 73 6f 2d 37 2f 30 2f 30 00 00 00   fold so-7/0/0...
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 0d 0a ................
  Transmitted path trace: fold so-7/0/0
    66 6f 6c 64 20 73 6f 2d 37 2f 30 2f 30 00 00 00   fold so-7/0/0...
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
...
```

show interfaces detail (IPv6 Tracking)

```
user@host> show interfaces so-0/2/0 detail
Physical interface: so-0/2/0, Enabled, Physical link is Up
   Interface index: 130, SNMP ifIndex: 26, Generation: 131
   Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode,
Speed: OC3,
   Loopback: None, FCS: 16, Payload scrambler: Enabled
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
   Link flags     : Keepalives
   Hold-times     : Up 0 ms, Down 0 ms
   Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
   Keepalive statistics:
     Input : 7 (last seen 00:00:01 ago)
     Output: 6 (last sent 00:00:08 ago)
   LCP state: Opened
   NCP state: inet: Not-configured, inet6: Opened, iso: Not- configured, mpls:
   Not-configured
   CHAP state: Closed
```

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```
  PAP state: Closed
  CoS queues     : 4 supported, 4 maximum usable queues
  Last flapped   : 2007-11-29 08:45:47 PST (1d 03:44 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :              7407782                   40 bps
   Output bytes  :              7307322                   48 bps
   Input  packets:               107570                    0 pps
   Output packets:               108893                    0 pps
   IPv6 transit statistics:
    Input  bytes  :               57328
    Output bytes  :               57400
    Input  packets:                1024
    Output packets:                1025
  Egress queues: 4 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets   Dropped packets
    0 best-effort       1191             1191                 0
    1 expedited-fo      0                0                    0
    2 assured-forw      0                0                    0
    3 network-cont      107700           107700               0
  SONET alarms   : None
  SONET defects  : None

  Logical interface so-0/2/0.0 (Index 70) (SNMP ifIndex 47) (Generation 231)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    Protocol inet6, MTU: 4470, Generation: 433, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: abcd::a18:104/126, Local: abcd::a18:105,
        Broadcast: Unspecified, Generation: 683
      Addresses, Flags: Is-Preferred
        Destination: fe80::/64, Local: fe80::2a0:a5ff:fe56:52a,
        Broadcast: Unspecified, Generation: 684
```

show interfaces (shared interface)

```
user@rsd1> show interfaces so-7/2/0
Physical interface: so-7/2/0, Enabled, Physical link is Down
  Interface index: 128, SNMP ifIndex: 109
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, SONET mode,
  Speed: OC192, Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Shared-interface  : Owner
  Link flags     : No-Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 0 (never), Output: 0 (never)
  DTE statistics:
    Enquiries sent                      : 0
    Full enquiries sent                 : 0
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
```


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```
  Keepalive responses timedout         : 0
CoS queues     : 8 supported, 8 maximum usable queues
Last flapped   : 2008-08-11 10:51:51 PDT (1w1d 04:47 ago)
Input rate     : 0 bps (0 pps)
Output rate    : 0 bps (0 pps)
SONET alarms   : LOL, PLL
SONET defects  : LOL, PLL, LOF, SEF, AIS-L, AIS-P

Logical interface so-7/2/0.0 (Index 67) (SNMP ifIndex 117)
  Flags: Device-Down Point-To-Point SNMP-Traps 0x4000 Encapsulation: FR-NLPID
  Shared interface:
    Shared with: psd5
    Tunnel token: Rx: 2.517, Tx: 1.517
  Input packets : 0
  Output packets: 0
  DLCI 700
    Flags: Active
    Total down time: 00:01:09 sec, Last down: 284:58:21 ago
      Input packets : 0
      Output packets: 0
DLCI statistics:
  Active DLCI  :1  Inactive DLCI  :0
```

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show interfaces (T1, E1, or DS)

Syntax

show interfaces *interface-type*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

Display status information about the specified T1, E1, or DS interface.

Options

interface-type—On ACX Series, M Series, MX Series, and T Series routers, the T1 interface type is **t1-*fpc/pic/port***, whereas the E1 interface type is **e1-*fpc/pic/port***, and DS interface type is **ds-*fpc/pic/port*:<channel>**. On the J Series routers, the T1 interface type is **t1-*pim*/0/*port***, whereas the E1 interface type is **e1-*pim*/0/*port***.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

Related Documentation

- *Understanding Interfaces on ACX Series Universal Access Routers*

List of Sample Output

show interfaces (T1, IMA Link) on page 822
show interfaces (T1, PPP) on page 823
show interfaces detail (T1, PPP) on page 823
show interfaces extensive (T1 CRC Errors) on page 824
show interfaces extensive (T1, PPP) on page 824
show interfaces (E1, Frame Relay) on page 826
show interfaces detail (E1, Frame Relay) on page 827
show interfaces extensive (E1, Frame Relay) on page 828
show interfaces (E1, IMA Link) on page 830
show interfaces extensive (T1, TDM-CCC-SATOP) on page 831
show interfaces extensive (DS, TDM-CCC-CESoPSN) on page 832

Output Fields

Table 47 on page 581 lists the output fields for the **show interfaces** (T1 or E1) command. Output fields are listed in the approximate order in which they appear.

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Table 60: T1 or E1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used for the E1 interface on the link: **G704**, **G704-NO-CRC4**, or **Unframed**. The default is **G704**. Physical layer framing format used for the T1 interface on the link: **SF** and **ESF**. The default is **ESF**.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**

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Table 60: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
IMA Link alarms	Current active IMA link alarms, including the following: • **LIF** • **LODS** • **RFI-IMA** • **Tx-Mis-Connected** • **Tx-Unusable-FE** • **Rx-Unusable-FE** • **Link Fault**	**detail extensive** none
IMA Link defects	Current active IMA link defects, including the following: • **LIF** • **LODS** • **RFI-IMA** • **Tx-Mis-Connected** • **Tx-Unusable-FE** • **Rx-Unusable-FE** • **Link Fault**	**detail extensive** none

IMA Link state	Current active IMA link status, including the following:
	• **Line:** synchronized or not synchronized
	• **Near end:**—Status of near-end receive and transmit links
	  ◦ **Rx:** Usable or Unusable
	  ◦ **Tx:** Usable or Unusable
	• **Far end:**—Status of far-end receive and transmit links
	  ◦ **Rx:** Usable or Unusable
	  ◦ **Tx:** Usable or Unusable
		detail extensive none

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Table 60: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
IMA link media	IMA Link Media Status, which provides the seconds and count state for the following link media parameters: • LIF • LODS • Err-ICP • IV • Rx-FC • Tx-FC • FE-Defects • FE-Rx-FC • FE-Tx-FC • Rx-ICP • Rx-Stuff • Tx-ICP • Tx-Stuff • Rx-SES • Rx-UAS • Rx-UUS • Tx-UUS • FE-Rx-SES • FE-Rx-UAS • FE-Rx-UUS • FE-Tx-UUS	**detail extensive** none
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

Keepalive statistics	(PPP and HDLC) Information about keepalive packets. (When no level of output is specified, the word **statistics** is not part of the field name and the **last seen** text is not displayed.)
	• **Input**—Number of keepalive packets received by PPP.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

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Table 60: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
LMI settings	(Frame Relay) Settings for Local Management Interface (LMI) which can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx*** seconds, where *value* can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) Local Management Interface (LMI) packet statistics: • **Input**—Number of packets coming in on the interface (***nn***) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh*:*mm*:*ss* ago)**. • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh*:*mm*:*ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communications equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 60: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no Local Management Interface (LMI) packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE.) Number of DLCIs configured from the DCE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) State of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response is not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Down**—CHAP authentication is incomplete (not yet completed or has failed). • **Not-configured**—CHAP is not configured on the interface. • **Opened**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago).**	**detail extensive** none

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Table 60: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS Queues	Number of CoS queues configured.	**detail extensive** none
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC or PIM. If the value of this field increments, the PIC or PIM is malfunctioning. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 60: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
DS1 alarms **DS1 defects**	E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see *Bellcore Telcordia GR-499-CORE*. • **AIS**—Alarm indication signal. • **LOF**—Loss of frame. • **LOS**—Loss of signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 60: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
T1 media or **E1 media**	Counts of T1 or E1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 or E1 media-specific error types are: • **SEF**—Severely errored framing • **BEE**—Bit error • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **YELLOW**—Errors at the remote site receiver • **CRC Major**—Cyclic redundancy check major alarm threshold exceeded • **CRC Minor**—Cyclic redundancy check minor alarm threshold exceeded • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CS**—Carrier state • **CRC**—Cyclic redundancy check • **FEBE**—Far-end block error (E1 only) • **LES**—Line error seconds • **ES**—Errored seconds • **BES**—Bursty errored seconds • **SES**—Severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
SAToP Configuration	Information about the SAToP configuration. • **payload-size**—Configure the payload size, in bytes (from 32 through 1024 bytes). • **idle-pattern**—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • **jitter-buffer-packets**—Number of packets in the jitter buffer (from 1 through 64 packets). • **jitter-buffer-latency**—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • **excessive-packet-loss-rate**—Set packet loss options. The options are **groups**, **sample-period**, and **threshold**. • **sample-period**—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • **threshold**—Percentile designating the threshold of excessive packet loss rate (1–100 percent).	**extensive**

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Table 60: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CESoPSN Configuration	Information about the CESoPSN configuration. • **packetization-latency**—Time required to create packets (from 1000 through 8000 microseconds). • **idle-pattern**—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • **jitter-buffer-packets**—Number of packets in the jitter buffer (from 1 through 64 packets). • **jitter-buffer-latency**—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • **excessive-packet-loss-rate**—Set packet loss options. The options are **sample-period** and **threshold**. • **sample-period**—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • **threshold**—Percentile designating the threshold of excessive packet loss rate (1–100 percent).	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Time slots configured on the interface. • **Buildout**—(T1 only) Buildout setting: 0-132, 133-265, 266-398, 399-531, or 532-655 feet. • **Timeslots**—Configured time slots for the interface. • **Byte encoding**—(T1 only) Byte encoding used: **Nx64K** or **Nx56K**. • **Line encoding**—Line encoding used. For T1, the value can be **B8ZS** or **AMI**. For E1, the value is **HDB3**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**. • **Idle cycle flag**—Idle cycle flags. • **Start end flag**—Start and end flag.	**extensive**
DS1 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**

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Table 60: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes a while (generally, less than 1 second) for this counter to stabilize.	**detail extensive**

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Table 60: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter normally stabilizes in less than 1 second.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, **mlfr**, or **mpls**.	**detail extensive** none
Multilink bundle	Interface name for the multilink bundle, if configured.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive** none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics** or (**Input packets, Output packets**). **Flags** can be one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **DCE-Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **DCE-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

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Table 60: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CE Info	Information related to the circuit emulation statistics. • **CE Tx**—Number of transmitted packets and bytes (TDM to PSN flow). • **CE Rx**—Number of received packets and bytes and forward bytes (PSN to TDM flow). • **CE Rx Forwarded**—Number of forwarded bytes. • **CE Strayed**—Number of stray packets. • **CE Lost**—Number of lost packets. • **CE Malformed**—Number of malformed packets • **CE Misinserted**—Number of misinserted packets. • **CE AIS dropped**—Number of dropped bytes due to buffer overrun (PSN to TDM). • **CE Dropped**—Number of dropped packets during resynchronization • **CE Overrun Events**—Number of overrun events. • **CE Underrun Events**—Number of underrun events.	**extensive**

Sample Output

show interfaces (T1, IMA Link)

```
user@host> show interfaces t1-1/0/0
  IMA Link alarms   : None
  IMA Link defects  : LIF, LODS
  IMA Link state:
    Line     : Not synchronized
    Near end : Rx: Unusable, Tx: Usable
    Far  end : Rx: Unusable, Tx: Usable
  IMA link media:          Seconds        Count  State
    LIF                                       0  OK
    LODS                                      0  OK
    Err-ICP                                   0  OK
    IV                                        0  OK
    Rx-FC                                     0  OK
    Tx-FC                                     0  OK
    FE-Defects                                0
    FE-Rx-FC                                  0
    FE-Tx-FC                                  0
    Rx-ICP                                    0
    Rx-Stuff                                  0
    Tx-ICP                                   11
    Tx-Stuff                                  0
    Rx-SES                    0
    Rx-UAS                    0
    Rx-UUS                    1
    Tx-UUS                    0
    FE-Rx-SES                 0
    FE-Rx-UAS                 0
    FE-Rx-UUS                 0
    FE-Tx-UUS                 0
```


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show interfaces (T1, PPP)

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:35 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 72 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None

  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255
```

show interfaces detail (T1, PPP)

```
user@host> show interfaces t1-1/1/0 detail
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:52 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                  798                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                   42                    0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0
```

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```
    2 assured-forw                 0                 0                 0

    3 network-cont                40                40                 0

  DS1   alarms   : None
  DS1   defects  : None
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1
  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 14, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 18
```

show interfaces extensive (T1 CRC Errors)

```
user@host> show interfaces t1-3/2/0:1:1 extensive
Physical interface: t1-3/2/0:1:1, Enabled, Physical link is Down
  Interface index: 179, SNMP ifIndex: 79, Generation: 180
  :
  :
  DS1   alarms   : AIS, LOF, CRC Major, CRC Minor
  DS1   defects  : AIS, LOF, CRC Major, CRC Minor
  T1  media:            Seconds        Count  State
    SEF                       1            1  OK
    BEE                       1            1  OK
    AIS                    1128            1  Defect Active
    LOF                    1128            1  Defect Active
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    CRC Major               154            1  Defect Active
    CRC Minor               154            1  Defect Active
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CS                        0            0
    CRC                     154        15400
    ...
```

show interfaces extensive (T1, PPP)

```
user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
```


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```
CHAP state: Closed
CoS queues     : 4 supported, 4 in use
Last flapped   : 2005-12-05 08:43:06 PST (02:13:54 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                    0                    0 bps
 Output bytes  :                  817                   72 bps
 Input  packets:                    0                    0 pps
 Output packets:                   43                    0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

  Resource errors: 0
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort                   0                    0                    0

  1 expedited-fo                  0                    0                    0

  2 assured-forw                  0                    0                    0

  3 network-cont                 42                   42                    0

DS1   alarms   : None
DS1   defects  : None
T1  media:            Seconds        Count  State
  SEF                       1            1  OK
  BEE                       0            0  OK
  AIS                       0            0  OK
  LOF                       1            1  OK
  LOS                       0            0  OK
  YELLOW                    1            1  OK
  BPV                       1            1
  EXZ                       1            1
  LCV                       1        65535
  PCV                       1         1023
  CS                        0            0
  LES                       1
  ES                        1
  SES                       1
  SEFS                      1
  BES                       0
  UAS                       0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : All active
  Line encoding: B8ZS
  Buildout       : 0 to 132 feet
  Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
  Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1
Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 1 (0x00)
```

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```
  CoS information:
    CoS transmit queue       Bandwidth          Buffer   Priority    Limit
                          %          bps     %     usec
    0 best-effort        95      1459200    95        0        low    none
    3 network-control     5        76800     5        0        low    none

  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 14, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 18
```

show interfaces (E1, Frame Relay)

```
user@host> show interfaces e1-3/0/0
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 0 (never), Output: 11 (00:00:05 ago)
  DTE statistics:
    Enquiries sent                      : 10
    Full enquiries sent                 : 1
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
    Keepalive responses timedout        : 1
  CoS queues     : 8 supported
  Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None
  Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Input packets : 0
  Output packets: 0
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255
    DLCI 100
      Flags: Down, DCE-Unconfigured
      Total down time: 00:01:13 sec, Last down: 00:01:13 ago
      Input packets : 0
      Output packets: 0
```


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```
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces detail (E1, Frame Relay)

```
user@host> show interfaces e1-3/0/0 detail
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37, Generation: 69
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 12 (last sent 00:00:02 ago)
  DTE statistics:
    Enquiries sent                      : 10
    Full enquiries sent                 : 2
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
    Keepalive responses timedout        : 1
  CoS queues     : 8 supported
  Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                 225                  56 bps
   Input  packets:                   0                   0 pps
   Output packets:                  15                   0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 limited                       0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 real-plus                     0                   0                   0

    3 network-cont                 15                  15                   0

  DS1   alarms   : None
  DS1   defects  : None
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
```

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```
    Input  packets:                  0
    Output packets:                  0
  Local statistics:
    Input  bytes  :                  0
    Output bytes  :                  0
    Input  packets:                  0
    Output packets:                  0
  Transit statistics:
    Input  bytes  :                  0                   0 bps
    Output bytes  :                  0                   0 bps
    Input  packets:                  0                   0 pps
    Output packets:                  0                   0 pps
  Protocol inet, MTU: 1500, Generation: 32, Route table: 0
    Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
      Generation: 42
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:01:18 sec, Last down: 00:01:18 ago
    Traffic statistics:
     Input  bytes  :                  0
     Output bytes  :                  0
     Input  packets:                  0
     Output packets:                  0
DLCI statistics:
  Active DLCI  :0  Inactive DLCI  :1
```

show interfaces extensive (E1, Frame Relay)

```
user@host> show interfaces e1-3/0/0 extensive
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37, Generation: 69
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 12 (last sent 00:00:05 ago)
  DTE statistics:
    Enquiries sent                     : 10
    Full enquiries sent                : 2
    Enquiry responses received         : 0
    Full enquiry responses received    : 0
  DCE statistics:
    Enquiries received                 : 0
    Full enquiries received            : 0
    Enquiry responses sent             : 0
    Full enquiry responses sent        : 0
  Common statistics:
    Unknown messages received          : 0
    Asynchronous updates received      : 0
    Out-of-sequence packets received   : 0
    Keepalive responses timedout       : 1
  CoS queues     : 8 supported
  Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Statistics last cleared: Never
```


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```
Traffic statistics:
 Input  bytes  :                    0                    0 bps
 Output bytes  :                  225                    0 bps
 Input  packets:                    0                    0 pps
 Output packets:                   15                    0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 17, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 limited                        0                    0                    0

  1 expedited-fo                   0                    0                    0

  2 real-plus                      0                    0                    0

  3 network-cont                  15                   15                    0

DS1   alarms   : None
DS1   defects  : None
E1  media:            Seconds        Count  State
  SEF                       0            0  OK
  BEE                       5            5  OK
  AIS                       0            0  OK
  LOF                     245           15  OK
  LOS                     245            4  OK
  YELLOW                    0           11  OK
  BPV                       0            0
  EXZ                       9            9
  LCV                       0            0
  PCV                       0            0
  CS                        0            0
  FEBE                      0            0
  LES                       0
  ES                        0
  SES                       0
  SEFS                      0
  BES                       0
  UAS                     271
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1506, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3, Data inversion: Disabled, Idle cycle flag: flags,
  Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 3, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue       Bandwidth          Buffer   Priority    Limit
                         %          bps     %     usec
  0 limited             95      1945600    95        0        low     none
  3 network-control      5       102400     5        0        low     none
Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
```

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```
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                    0 bps
     Output bytes  :                   0                    0 bps
     Input  packets:                   0                    0 pps
     Output packets:                   0                    0 pps
    Protocol inet, MTU: 1500, Generation: 32, Route table: 0
      Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
        Generation: 42
    DLCI 100
      Flags: Down, DCE-Unconfigured
      Total down time: 00:01:21 sec, Last down: 00:01:21 ago
      Traffic statistics:
       Input  bytes  :                  0
       Output bytes  :                  0
       Input  packets:                  0
       Output packets:                  0
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces (E1, IMA Link)

```
user@host> show interfaces e1-1/0/0
  IMA Link alarms   : None
  IMA Link defects  : LIF, LODS
  IMA Link state:
    Line     : Not synchronized
    Near end : Rx: Unusable, Tx: Usable
    Far  end : Rx: Unusable, Tx: Usable
  IMA link media:          Seconds        Count  State
    LIF                                       0
    LODS                                      0
    Err-ICP                                   0
    IV                                        0
    Rx-FC                                     0
    Tx-FC                                     0
    FE-Defects                                0
    FE-Rx-FC                                  0
    FE-Tx-FC                                  0
    Rx-ICP                                    0
    Rx-Stuff                                  0
    Tx-ICP                                   11
    Tx-Stuff                                  0
    Rx-SES                    0
    Rx-UAS                    0
    Rx-UUS                    1
    Tx-UUS                    0
    FE-Rx-SES                 0
    FE-Rx-UAS                 0
```


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```
    FE-Rx-UUS                   0
    FE-Tx-UUS                   0
```

show interfaces extensive (T1, TDM-CCC-SATOP)

```
user@host>show interfaces t1-1/0/0:1:1 extensive
Physical interface: t1-1/0/0:1:1, Enabled, Physical link is Down
  Interface index: 153, SNMP ifIndex: 579, Generation: 817
  Link-level type: TDM-CCC-SATOP, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-1/0/0:1 Interface index 152
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2012-10-28 02:12:40 PDT (22:32:13 ago)
  Statistics last cleared: 2012-10-29 00:44:52 PDT (00:00:01 ago)
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 assured-forw                  0                   0                   0

    3 network-cont                  0                   0                   0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  DS1   alarms   : None
  DS1   defects  : None
  T1  media:            Seconds        Count  State
    SEF                         0            0  OK
    BEE                         0            0  OK
    AIS                         0            0  OK
    LOF                         0            0  OK
    LOS                         0            0  OK
    YELLOW                      0            0  OK
    CRC Major                   0            0  OK
    CRC Minor                   0            0  OK
    BPV                         0            0
    EXZ                         0            0
    LCV                         0            0
    PCV                         0            0
    CS                          0            0
    CRC                         0            0
    LES                         0
    ES                          0
    SES                         0
    SEFS                        0
    BES                         0
    UAS                         0
  SAToP configuration:
    Payload size: 192
    Idle pattern: 0xFF
    Octet aligned: Disabled
```

```
    Jitter buffer: packets: 8, latency: 7 ms, auto adjust: Disabled
    Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  SONET alarms    : None
  SONET defects   : AIS-V, RDI-V
  SONET vt:
    BIP-BIP2                      0            0
    REI-V                         0            0
    LOP-V                         0            0  OK
    AIS-V                         2            0  Defect Active
    RDI-V                         2            0  Defect Active
    UNEQ-V                        0            0  OK
    PLM-V                         0            0  OK
    ES-V                          0
    SES-V                         0
    UAS-V                         2
    ES-VFE                        0
    SES-VFE                       0
    UAS-VFE                       0
  Received SONET overhead:
V5      : 0x07
V5(cmp) : 0x02
  Transmitted SONET overhead:
V5      : 0x02
  Packet Forwarding Engine configuration:
    Destination slot: 1
  CoS information:
    Direction : Output
    CoS transmit queue               Bandwidth               Buffer Priority
Limit
                              %           bps     %           usec
    0 best-effort            95       1459200    95              0      low
none
    3 network-control         5         76800     5              0      low
none

  Logical interface t1-1/0/0:1:1.0 (Index 69) (SNMP ifIndex 580) (Generation 525)

    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-SATOP
  CE info               Packets        Bytes  Count
    CE Tx                  1005       192960
    CE Rx                  1004       192768
    CE Rx Forwarded                       0
    CE Strayed                0
    CE Lost                   0
    CE Malformed              0
    CE Misinserted            0
    CE AIS dropped            0
    CE Dropped             1005       192960
    CE Overrun Events                      0
    CE Underrun Events                     0
    Protocol ccc, MTU: 1504, Generation: 814, Route table: 0
      Flags: Is-Primary
```

show interfaces extensive (DS, TDM-CCC-CESoPSN)

```
user@host>show interfaces ds-1/0/0:1:1:1 extensive
Physical interface: ds-1/0/0:1:1:1, Enabled, Physical link is Down
  Interface index: 154, SNMP ifIndex: 597, Generation: 819
```


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```
  Link-level type: TDM-CCC-CESoPSN, MTU: 1504, Speed: 1536kbps, Loopback: None,
FCS: 16, Parent: ct1-1/0/0:1:1 Interface index 153
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2012-10-29 00:49:03 PDT (00:00:35 ago)
  Statistics last cleared: Never
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                    0                    0

    1 expedited-fo                  0                    0                    0

    2 assured-forw                  0                    0                    0

    3 network-cont                  0                    0                    0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  CESoPSN configuration:
    Packetization latency: 1000 us
    Idle pattern: 0xFF
    Jitter buffer: packets: 8, latency: 8 ms, auto adjust: Disabled
    Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 1
  CoS information:
    Direction : Output
    CoS transmit queue              Bandwidth               Buffer Priority
Limit
                                %           bps     %           usec
    0 best-effort              95       1459200    95              0      low
none
    3 network-control           5         76800     5              0      low
none

  Logical interface ds-1/0/0:1:1:1.0 (Index 69) (SNMP ifIndex 598) (Generation
549)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-CESoPSN
  CE info               Packets        Bytes  Count
    CE Tx                     0            0
    CE Rx                 35712       6856704
    CE Rx Forwarded                        0
    CE Strayed                0
    CE Lost                   0
    CE Malformed              0
    CE Misinserted            0
    CE AIS dropped            0
    CE Dropped                0            0
    CE Overrun Events                         0
    CE Underrun Events                        1
```

```
    Protocol ccc, MTU: 1504, Generation: 857, Route table: 0
      Flags: Is-Primary
```


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show interfaces (T3 or E3)

Syntax

show interfaces *interface-type*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

Display status information about the specified T3 or E3 interface.

Options

interface-type—On M Series and T Series routers, the T3 interface type is **t3-*fpc/pic/port***, whereas the E3 interface type is **e3-*fpc/pic/port*** On the J Series routers, the T3 interface type is **t3-*pim*/0/*port***, whereas the E3 interface type is **e3-*pim*/0/*port***.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces (T3, PPP) on page 844
show interfaces detail (T3, PPP) on page 845
show interfaces extensive (T3, PPP) on page 846
show interfaces (E3, Frame Relay) on page 847
show interfaces detail (E3, Frame Relay) on page 848
show interfaces extensive (E3, Frame Relay) on page 849

Output Fields

Table 61 on page 835 lists the output fields for the **show interfaces** (T3 or E3) command. Output fields are listed in the approximate order in which they appear.

Table 61: T3 or E3 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none

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Table 61: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Mode	(T3 only) Whether C-bit parity mode or M13 mode is enabled.	All levels
Long buildout	(T3 only) Buildout setting: less than 255 feet (68 meters) or greater than 255 feet and shorter than 450 feet (137 meters).	All levels
Framing	(E3 only) Physical layer framing format used on the link. It can be **G751** or **Unframed**. The default is **G751.**	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **interval *seconds***—Time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count *number***—Number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count *number***—Number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 61: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics or **Keepalive**	(PPP and HDLC) Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

LMI settings	(Frame Relay) Local Management Interface (LMI) settings (ANSI or ITU). ANSI LMI settings is the default. The format is **LMI settings: *value*, *value*... *xx*** seconds, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) LMI statistics: • **Input**—Number of packets coming in on the interface (*nn*) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)**. • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh:mm:ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communications equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 61: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE.) Number of DLCIs configured from the DCE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Resp-received**—Response received for the challenge sent, but CHAP not yet moved into the Success state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response sent for the challenge received. • **Chap-Chal-sent**—Challenge sent. • **Chap-Chal-received**—Challenge received but response not yet sent. • **Down**—CHAP authentication is incomplete (not yet completed or has failed). • **Not-configured**—CHAP is not configured on the interface. • **Opened**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*year-month-day hour:minute:second* ago)** . For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none
CoS queues	Number of CoS queues configured.	**detail extensive** none

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Table 61: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface • **Output packets**—Number of packets received on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—(T3 only) Number of frames received that are smaller than the runt threshold. • **Giants**—(T3 only) Number of frames received that are larger than the giant threshold. • **Bucket Drops**—Drops resulting from the traffic load exceeding the interface transmit/receive leaky bucket configuration. The default is **off**. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC or PIM. If the value of this field increments, the PIC or PIM is malfunctioning. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 61: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
Active alarms **Active defects**	E3 media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. • **AIS**—Alarm indication signal • **EXZ**—Excessive zeros • **FERF**—Far-end receive failures • **IDLE**—Idle code detected • **LCD**—Loss of cell delineation • **LCV**—Line code violation • **LOF**—Loss of frame • **LOS**—Loss of signal • **PLL**—Phase-locked loop • **YLW**—Remote defect indication	**detail extensive** none

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Table 61: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS3 media or **E3 media**	Counts of DS3 (T3) or E3 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than OK indicates a problem. The DS3 or E3 media-specific error types can be: • **PLL Lock**—Phase-locked loop out of lock • **Reframing**—Frame alignment recovery time • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **IDLE**—Idle code detected • **YELLOW**—Errors at the remote site receiver • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—(DS3 only) Pulse code violation • **CCV**—(DS3 only) C-bit coding violation • **FEBE**—(DS3 only) Far-end block error • **LES**—Line error seconds • **PES**—(DS3 only) P-bit errored seconds • **PSES**—(DS3 only) P-bit errored seconds (section) • **CES**—(DS3 only) C-bit errored seconds • **CSES**—(DS3 only) C-bit severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Idle cycle flag**—Idle cycle flags. • **Start end flag**—Start and end flag.	**extensive**

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Table 61: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DSU configuration	Information about the DSU configuration. The last three lines (**Bit count**, **Error bit count**, and **LOS information**) are displayed only if a BERT has ever been run on the interface. • **Compatibility mod**—CSU/DSU compatibility mode: **None**, **Larscom**, **Kentrox**, or **Digital-Link**. • **Scrambling**—Payload scrambling: **Enabled** or **Disabled**. • **Subrate**—Configured subrate setting. Applies only when **Digital-Link** compatibility mode is used. The subrate can be **Disabled** or display units in Kbps. • **FEAC loopbac**—(T3) Whether a far-end alarm and control (FEAC) loopback is **Active** or **Inactive**. This feature is used to send alarm or status information from the far-end terminal back to the near-end terminal and to initiate T3 loopbacks at the far-end terminal from the near-end terminal. • **Response**—Whether the FEAC signal is **Enabled** or **Disabled**. • **Count**—Number of FEAC loopbacks.	**extensive**
DS3 (or **E3**) **BERT configuration**	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		

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Table 61: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Logical interface	Name of the logical interface.	**detail extensive** none
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**extensive**
Flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	**detail extensive** none
Encapsulation	Encapsulation on the logical interface.	**detail extensive** none
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter normally stabilizes in less than 1 second.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, **mlfr**, or **mpls**.	**detail extensive** none
Multilink bundle	(Multilink) Interface name for the multilink bundle.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none

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Table 61: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive** none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics** (or **Input packets**, **Output packets**). **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **DCE Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **DCE-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces (T3, PPP)

```
user@host> show interfaces t3-0/2/0
Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 35
  Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity,
  Long buildout: Shorter than 255 feet
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Closed
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:18:40 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 72 bps (0 pps)
```


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```
  Active alarms  : None
  Active defects : None
  DS3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^15 - 1, O.151, Pseudorandom (9), Induced error rate: 10e-0

Logical interface t3-0/2/0.0 (Index 66) (SNMP ifIndex 54)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255
```

show interfaces detail (T3, PPP)

```
user@host> show interfaces t3-0/2/0 detail
Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 35, Generation: 22
  Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity,
  Long buildout: Shorter than 255 feet
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Closed
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:18:45 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                 152                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   8                   0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                   0                    0

    1 expedited-fo                   0                   0                    0

    2 assured-forw                   0                   0                    0

    3 network-cont                   6                   6                    0

  Active alarms  : None
  Active defects : None
  DS3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^15 - 1, O.151, Pseudorandom (9), Induced error rate: 10e-0

Logical interface t3-0/2/0.0 (Index 66) (SNMP ifIndex 54) (Generation 8)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470, Generation: 17, Route table: 0
      Flags: Protocol-Down
```

```
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 24
```

show interfaces extensive (T3, PPP)

```
user@host> show interfaces t3-0/2/0 extensive
Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 35, Generation: 22
  Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity,
  Long buildout: Shorter than 255 feet
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Closed
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:18:47 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                 171                  72 bps
   Input  packets:                   0                   0 pps
   Output packets:                   9                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Bucket drops: 0, Policed discards: 0, L3 incompletes: 0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    SRAM errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

    Resource errors: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 assured-forw                  0                   0                   0

    3 network-cont                  7                   7                   0

  Active alarms  : None
  Active defects : None
  DS3 media:            Seconds        Count  State
    PLL Lock                  0            0  OK
    Reframing                 0            0  OK
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
```


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```
    BPV                         0           0
    EXZ                         0           0
    LCV                         1           4
    PCV                         0           0
    CCV                         0           0
    FEBE                        1          11
    LES                         1
    PES                         0
    PSES                        0
    CES                         0
    CSES                        0
    SEFS                        0
    UAS                         0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 4484, Runt threshold: 3
    Idle cycle flag: flags, Start end flag: shared
  DSU configuration:
    Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
    FEAC loopback: Inactive, Response: Disabled, Count: 0
  DS3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^15 - 1, O.151, Pseudorandom (9), Induced error rate: 10e-0
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 1 (0x00)
  CoS information:
    CoS transmit queue       Bandwidth          Buffer   Priority    Limit
                          %          bps     %     usec
    0 best-effort        95     42499200    95        0         low    none
    3 network-control     5      2236800     5        0         low    none

Logical interface t3-0/2/0.0 (Index 66) (SNMP ifIndex 54) (Generation 8)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470, Generation: 17, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 24
```

show interfaces (E3, Frame Relay)

```
user@host> show interfaces e3-1/2/0
Physical interface: e3-1/2/0, Enabled, Physical link is Up
  Interface index: 153, SNMP ifIndex: 49
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, Speed: E3,
  Loopback: None, FCS: 16, Framing: G751
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 0 (never), Output: 4 (00:00:06 ago)
  DTE statistics:
    Enquiries sent                      : 4
    Full enquiries sent                 : 0
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
```

```
    Full enquiry responses sent          : 0
  Common statistics:
    Unknown messages received            : 0
    Asynchronous updates received        : 0
    Out-of-sequence packets received     : 0
    Keepalive responses timedout         : 1
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:46:14 PST (02:27:17 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None

  Logical interface e3-1/2/0.0 (Index 66) (SNMP ifIndex 57)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Input packets : 0
  Output packets: 0
    Protocol inet, MTU: 4470
      Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255
    DLCI 100
      Flags: Down, DCE-Unconfigured
      Total down time: 00:00:06 sec, Last down: 00:00:06 ago
      Input packets : 0
      Output packets: 0
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces detail (E3, Frame Relay)

```
user@host> show interfaces e3-1/2/0 detail
Physical interface: e3-1/2/0, Enabled, Physical link is Up
  Interface index: 153, SNMP ifIndex: 49, Generation: 36
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, Speed: E3,
  Loopback: None, FCS: 16, Framing: G751
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 5 (last sent 00:00:07 ago)
  DTE statistics:
    Enquiries sent                       : 5
    Full enquiries sent                  : 0
    Enquiry responses received           : 0
    Full enquiry responses received      : 0
  DCE statistics:
    Enquiries received                   : 0
    Full enquiries received              : 0
    Enquiry responses sent               : 0
    Full enquiry responses sent          : 0
  Common statistics:
    Unknown messages received            : 0
    Asynchronous updates received        : 0
    Out-of-sequence packets received     : 0
    Keepalive responses timedout         : 1
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:46:14 PST (02:27:27 ago)
```


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```
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                  806                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                   44                    0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                  43                   43                    0

  Active alarms  : None
  Active defects : None

  Logical interface e3-1/2/0.0 (Index 66) (SNMP ifIndex 57) (Generation 15)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                    0
     Output bytes  :                    0
     Input  packets:                    0
     Output packets:                    0
    Local statistics:
     Input  bytes  :                    0
     Output bytes  :                    0
     Input  packets:                    0
     Output packets:                    0
    Transit statistics:
     Input  bytes  :                    0                    0 bps
     Output bytes  :                    0                    0 bps
     Input  packets:                    0                    0 pps
     Output packets:                    0                    0 pps
    Protocol inet, MTU: 4470, Generation: 24, Route table: 0
      Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 38
    DLCI 100
      Flags: Down, DCE-Unconfigured
      Total down time: 00:00:16 sec, Last down: 00:00:16 ago
      Traffic statistics:
       Input  bytes  :                    0
       Output bytes  :                    0
       Input  packets:                    0
       Output packets:                    0
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces extensive (E3, Frame Relay)

```
user@host> show interfaces e3-1/2/0 extensive
Physical interface: e3-1/2/0, Enabled, Physical link is Up
  Interface index: 153, SNMP ifIndex: 49, Generation: 36
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, Speed: E3,
  Loopback: None, FCS: 16, Framing: G751
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
```

```
Link flags     : Keepalives DTE
Hold-times     : Up 0 ms, Down 0 ms
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI statistics:
  Input : 0 (last seen: never)
  Output: 6 (last sent 00:00:02 ago)
DTE statistics:
  Enquiries sent                       : 5
  Full enquiries sent                  : 1
  Enquiry responses received           : 0
  Full enquiry responses received      : 0
DCE statistics:
  Enquiries received                   : 0
  Full enquiries received              : 0
  Enquiry responses sent               : 0
  Full enquiry responses sent          : 0
Common statistics:
  Unknown messages received            : 0
  Asynchronous updates received        : 0
  Out-of-sequence packets received     : 0
  Keepalive responses timedout         : 1
CoS queues     : 4 supported, 4 in use
Last flapped   : 2005-12-05 08:46:14 PST (02:27:30 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                    0                    0 bps
 Output bytes  :                  821                   56 bps
 Input  packets:                    0                    0 pps
 Output packets:                   45                    0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 21118, Bucket drops: 0,
  Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
  L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0,
  Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

  Resource errors: 0
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort                    0                    0                    0

  1 expedited-fo                   0                    0                    0

  2 assured-forw                   0                    0                    0

  3 network-cont                  44                   44                    0

Active alarms  : None
Active defects : None
E3  media:            Seconds        Count  State
  PLL Lock                  0            0  OK
  Reframing               187            1  OK
  AIS                       0            0  OK
  LOF                     187            1  OK
  LOS                     187            1  OK
  IDLE                      0            0  OK
  YELLOW                    0            0  OK
  BPV                       0            0
  EXZ                       0            0
  LCV                     188     12303167
```


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```
  LES                     188
  SEFS                    187
  UAS                     195
DSU configuration:
  Compatibility mode: None, Scrambling: Disabled
E3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, O.151, Pseudorandom (9), Induced Error rate: 10e-0
Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue       Bandwidth          Buffer   Priority    Limit
                        %          bps     %     usec
  0 best-effort        95     32649600    95        0         low     none
  3 network-control     5      1718400     5        0         low     none

Logical interface e3-1/2/0.0 (Index 66) (SNMP ifIndex 57) (Generation 15)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Traffic statistics:
   Input  bytes  :                   0
   Output bytes  :                   0
   Input  packets:                   0
   Output packets:                   0
  Local statistics:
   Input  bytes  :                   0
   Output bytes  :                   0
   Input  packets:                   0
   Output packets:                   0
  Transit statistics:
   Input  bytes  :                   0                    0 bps
   Output bytes  :                   0                    0 bps
   Input  packets:                   0                    0 pps
   Output packets:                   0                    0 pps
  Protocol inet, MTU: 4470, Generation: 24, Route table: 0
    Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
      Generation: 38
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:00:19 sec, Last down: 00:00:19 ago
    Traffic statistics:
     Input  bytes  :                  0
     Output bytes  :                  0
     Input  packets:                  0
     Output packets:                  0
DLCI statistics:
  Active DLCI  :0  Inactive DLCI  :1
```

show interfaces (Channelized STM1)

Syntax show interfaces e1-*fpc/pic/port*:*e1channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information about the specified channelized STM1 interface.

Options **e1-*fpc/pic/port*:*e1channel***—Display standard status information about the specified channelized STM1 interface.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output show interfaces extensive (Channelized STM1, SDH) on page 863

Output Fields Table 44 on page 536 lists the output fields for the **show interfaces** (all Channelized STM1 interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 62: Channelized STM1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

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Table 62: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used on the link. It can be **G704**, **G704-NO-CRC4**, or **Unframed**. The default is **G704**.	All levels
Parent	(Channelized STM1 IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **interval***seconds*—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is**1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 62: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	(PPP and HDLC) Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

ANSI LMI settingsor **ITU LMI settings**	(Frame Relay) Local Management Interface settings. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx*** seconds, where ***value*** can be: • **n391dte**—DTE full status polling interval (1- 255) • **n392dce**—DCE error threshold (1-10) • **n392dte**—DTE error threshold (1-10) • **n393dce**—DCE monitored event count (1-10) • **n393dte**—DTE monitored event count (1-10) • **t391dte**—DTE polling timer (5-30 seconds) • **t392dce**—DCE polling verification timer (5-30 seconds)	**detail extensive** none
LMI	(Frame Relay) Statistics about the link management. • **Input**—Number of packets coming in on the interface (***nn***) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)**. • **Output**—Number of packets sent out on the interface (***nn***) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last seen *hh:mm:ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data circuit-terminating equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 62: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay, displayed only from the DTE) Number of DLCIs configured from the DCE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*****hour:minute:second*** **ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none

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Table 62: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value of this field increments, the PIC is malfunctioning.	**extensive**

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Table 62: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware.	**extensive**
DS1 alarms **DS1 defects**	E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see *Bellcore Telcordia GR-499-CORE*. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none
SDH alarms **SDH defects**	SDH media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: SDH PHY, SDH regenerator section, SDH multiplex section, and SDH path. NOTE: For controller-based SONET PICs, the SDH alarms and SDH defects output in the **show interface cstm1 extensive** command output only shows the section and line level defects. The path level defects can be found under the SONET (so) interface output.	All levels

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Table 62: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
E1 media	Active alarms and defects, plus counts of specific E1 errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Error types can be: • **AIS**—Alarm indication signal • **BEE**—Bit error • **BES**—Bit error seconds • **BPV**—Bipolar violation • **CS**—Carrier state • **ES**—Errored seconds • **EXZ**—Excessive zeros • **FEBE**—Far-end block error • **LCV**—Line code violation • **LES**—Line error seconds • **LOF**—Loss of frame • **LOS**—Loss of signal • **PCV**—Pulse code violation • **SEF**—Severely errored framing • **SEFS-S**—Severely errored framing seconds (section) • **SES**—Severely errored seconds • **UAS**—Unavailable seconds • **YELLOW**—Errors at the remote site receiver	**extensive**
Interface transmit queues	Names of the transmit queues and their associated statistics for each E1 channel on the Channelized STM1-to-E1 PIC. • **B/W**—Queue bandwidth as a percentage of the total interface bandwidth. • **WRR**—Weighted round-robin (in percent). • **Packets**—Number of packets transmitted. • **Bytes**—Number of bytes transmitted. • **Drops**—Number of packets dropped. • **Errors**—Number of packet errors.	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Line encoding**—Line encoding used. It is always **HDB3**.	**extensive**

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Table 62: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS1 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
SDH PHY	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **PLL Lock**—Phase-locked loop • **PHY Light**—Loss of optical signal	**extensive**
SDH regenerator section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **RS-BIP8**—24-bit BIP for multiplex section overhead (B2 bytes) • **OOF**—Out of frame • **LOS**—Loss of signal • **LOF**—Loss of frame • **RS-ES**—Errored seconds (near-end regenerator section) • **RS-SES**—Severely errored seconds (near-end regenerator section) • **RS-SEFS**—Severely errored framing seconds (regenerator section)	**extensive**

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Table 62: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SDH multiplex section	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **MS-BIP24**—8-bit BIP for high-order path overhead (B3 byte) • **MS-FEBE**—Far-end block error (multiplex section) • **MS-FERF**—Far-end remote fail (multiplex section) • **MS-AIS**—alarm indication signal (multiplex section) • **BERR-SF**—Bit error rate fault (signal failure) • **BERR-SD**—Bit error rate defect (signal degradation) • **MS-ES**—Errored seconds (near-end multiplex section) • **MS-SES**—Severely errored seconds (near-end multiplex section) • **MS-UAS**—Unavailable seconds (near-end multiplex section) • **MS-ES-FE**—Errored seconds (far-end multiplex section) • **MS-SES-FE**—Severely errored seconds (far-end multiplex section) • **MS-UAS-FE**—Unavailable seconds (far-end multiplex section)	**extensive**
SDH path	Active alarms and defects, plus counts of specific SDH errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **HP-BIP8**—8-bit BIP for regenerator section overhead (B1 byte) • **HP-FEBE**—Far-end block error (high-order path) • **HP-LOP**—Loss of pointer (high-order path) • **HP-AIS**—High-order-path alarm indication signal • **HP-FERF**—Far-end remote fail (high-order path) • **HP-UNEQ**—Unequipped (high-order path) • **HP-PLM**—Payload label mismatch (high-order path) • **HP-ES**—Errored seconds (near-end high-order path) • **HP-SES**—Severely errored seconds (near-end high-order path) • **HP-UAS**—Unavailable seconds (near-end high-order path) • **HP-ES-FE**—Errored seconds (far-end high-order path) • **HP-SES-FE**—Severely errored seconds (far-end high-order path) • **HP-UAS-FE**—Unavailable seconds (far-end high-order path)	**extensive**

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Table 62: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SDH tu	Active alarms and defects, plus counts of specific SDH tributary unit (TU) errors with detailed information. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. Subfields are: • **TU-BIP-2**—Bit interleaved parity for SONET line overhead • **TU-FEBE**—(near-end TU) • **TU-LOP**—Loss of pointer (near-end TU) • **TU-AIS**—Alarm indication signal (near-end TU) • **TU-FERF**—(near-end TU) • **TU-UNEQ**—Unequipped (near-end TU) • **TU-PLM**—Payload label mismatch (near-end TU) • **TU-ES**—Errored seconds (near-end TU) • **TU-SES**—Severely errored seconds (near-end TU) • **TU-UAS**—Unavailable seconds (near-end TU) • **TU-ES-FE**—Errored seconds (far-end TU) • **TU-SES-FE**—Severely errored seconds (far-end TU) • **TU-UAS-FE**—Unavailable seconds (far-end TU)	**extensive**
Received SDH overhead **Transmitted SDH overhead**	Values of the received and transmitted SONET overhead: • **C2**—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P. • **F1**—Section user channel byte. This byte is set aside for the purposes of users. • **K1** and **K2**—These bytes are allocated for APS signaling for the protection of the multiplex section. • **J0**—Section trace. This byte is defined for STS-1 number 1 of an STS-*N* signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter. • **S1**—Synchronization status. The S1 byte is located in the first STS-1 of an STS-*N* signal. • **Z3** and **Z4**—Allocated for future use.	**extensive**
Received path trace **Transmitted path trace**	Channelized OC12 interfaces allow path trace bytes to be sent inband across the SONET/SDH link. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits. This information is specific to each of the 12 channelized OC12 interfaces.	**extensive**
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**

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Table 62: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Flags	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, or **mpls**.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none

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Table 62: Channelized STM1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces extensive (Channelized STM1, SDH)

```
user@host> show interfaces e1-1/0/0:1 extensive
Physical interface: e1-1/0/0:1, Enabled, Physical link is Up
  Interface index: 148, SNMP ifIndex: 285, Generation: 2915
  Link-level type: Frame-relay, MTU: 1504, SDH mode, Speed: E1, Loopback: None,
  FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
  Hold-times     : Up 0 ms, Down 0 ms
```

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```
Last flapped   : 2002-05-23 17:02:59 PDT (17:23:45 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                  592                   48 bps
 Output bytes  :                  644                   48 bps
 Input  packets:                   46                    0 pps
 Output packets:                   46                    0 pps
Input errors:
  Errors: 0, Drops: 9, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 11, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
DS1   alarms   : None
DS1   defects  : None
SDH   alarms   : None
SDH   defects  : None
E1  media:            Seconds        Count  State
  SEF                       0            0  OK
  BEE                       0            0  OK
  AIS                     124            1  OK
  LOF                     124            1  OK
  LOS                       0            0  OK
  YELLOW                    0            0  OK
  BPV                       0            0
  EXZ                       0            0
  LCV                       0            0
  PCV                       0            0
  CS                        0            0
  FEBE                      0            0
  LES                     124
  ES                      125
  SES                     124
  SEFS                    124
  BES                       0
  UAS                      37
Interface transmit queues:
            B/W  WRR       Packets        Bytes        Drops       Errors
  Queue0     95   95             0            0            0            0
  Queue1      5    5           529         6348            0            0
HDLC configuration:
  Giant threshold: 0, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
SDH PHY:              Seconds        Count  State
  PLL Lock                  0            0  OK
  PHY Light                 0            0  OK
SDH regenerator section:
  RS-BIP8                   0            0
  OOF                     125            1  OK
  LOS                     125            1  OK
  LOF                     125            1  OK
  RS-ES                   125
  RS-SES                  125
  RS-SEFS                 125
SDH multiplex section:
  MS-BIP24                  0            0
  MS-FEBE                   0            0
```


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```
  MS-FERF                   0            0  OK
  MS-AIS                  125            1  OK
  BERR-SF                   0            0  OK
  BERR-SD                   0            0  OK
  MS-ES                   125
  MS-SES                  125
  MS-UAS                  115
  MS-ES-FE                  0
  MS-SES-FE                 0
  MS-UAS-FE                 0
SDH path:
  HP-BIP8                   0            0
  HP-FEBE                   0            0
  HP-LOP                    0            0  OK
  HP-AIS                  125            1  OK
  HP-FERF                   0            0  OK
  HP-UNEQ                   0            0  OK
  HP-PLM                  125            1  OK
  HP-ES                   125
  HP-SES                  125
  HP-UAS                  115
  HP-ES-FE                  0
  HP-SES-FE                 0
  HP-UAS-FE                 0
SDH tu:
  TU-BIP2                   0            0
  TU-FEBE                 124            1
  TU-LOP                    0            0  OK
  TU-AIS                  124            1  OK
  TU-FERF                 124            1  OK
  TU-UNEQ                   0            0  OK
  TU-PLM                  124            1  OK
  TU-ES                   125
  TU-SES                  125
  TU-UAS                  115
  TU-ES-FE                  0
  TU-SES-FE                 0
  TU-UAS-FE                 0
Received SDH overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x02, C2(cmp) : 0x02, F2      : 0x00
  Z3      : 0x00, Z4      : 0x00, S1(cmp) : 0x00, V5      : 0x02
  V5(cmp) : 0x02
Transmitted SDH overhead:
  F1      : 0x00, J0      : 0x00, K1      : 0x00, K2      : 0x00
  S1      : 0x00, C2      : 0x02, F2      : 0x00, Z3      : 0x00
  Z4      : 0x00, V5      : 0x02
Received path trace:
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
Transmitted path trace:
  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 2 (0x07)
CoS information:
  CoS transmit queue              Bandwidth           Buffer Priority   Limit
                             %          bps   %         usec
  0 best-effort             95      1945600  95            0      low    none
  3 network-control          5       102400   5            0      low    none
Logical interface e1-1/0/0:1.0 (Index 10) (SNMP ifIndex 369) (Generation 496)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 575, Route table: 0
```

```
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 19.19.19.3, Local: 19.19.19.4, Broadcast: Unspecified,
      Generation: 975
  DLCI 100
    Flags: Active, Dce-configured
    Total down time: 0 sec, Last down: Never
    Traffic statistics:
     Input  bytes  :                  0
     Output bytes  :                  0
     Input  packets:                  0
     Output packets:                  0
DLCI statistics:
  Active DLCI  :2 Inactive DLCI  : 0
```


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show interfaces (Channelized T1 IQ)

Syntax show interfaces (ct1-*fpc/pic/port* | *type-fpc/pic/port*<:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced in Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information about the specified channelized T1 IQ interface.

Options ***type-fpc/pic/port*:*channel***—Interface type. With optional corresponding channel levels, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized T1 IQ interface, ***type*** is **ct1.**
- ***type-fpc/pic/port*:*channel***—For the clear channel, ***type*** is **t1**. At the first level of channelization, ***type*** can be **ct1** or **t1.**
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ds**.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output
show interfaces extensive (CT1) on page 875
show interfaces extensive (T1) on page 876
show interfaces extensive (DS0) on page 877

Output Fields Table 45 on page 551 lists the output fields for the **show interfaces** (Channelized T1 IQ and T3 IQ interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 63: Channelized T1 IQ and T3 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels

Table 63: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used on the link. It can be **ESF** or **SF**. The default is **ESF**.	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	Configured settings for keepalives. • **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 63: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

LMI settings	(Frame Relay) Settings for Local Management Interface (LMI) can be either **ANSI LMI settings** or **ITU LMI settings**. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx seconds***, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) LMI packet statistics: • **Input**—Number of packets coming in on the interface (***nn***) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)**. • **Output**—Number of packets sent out on the interface (***nn***) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh:mm:ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communication equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 63: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the**Success** state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*****hour:minute:second*** **ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none

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Table 63: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS queues	Number of CoS queues configured.	**detail extensive** none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface. • **Input packets, Output packets**—Number of packets received and transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Giants**—Number of frames received that are larger than the giant threshold. • **Runts**—Number of frames received that are smaller than the runt threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Counter increments when the software could not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 63: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets whose size exceeds the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
DS1 alarms DS1 defects	Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 63: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
T1 media	Counts of T1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 media-specific error types can be: • **AIS**—Alarm indication signal • **BEE**—Bit error event • **BES**—Bit error seconds • **BPV**—Bipolar violation • **CS**—Carrier state • **ES**—Errored seconds • **EXZ**—Excessive zeros • **FEBE**—Far-end block error • **LCV**—Line code violation • **LES**—Line error seconds • **LOF**—Loss of frame • **LOS**—Loss of signal • **PCV**—Pulse code violation • **SEF**—Severely errored framing • **SEFS**—Severely errored framing seconds (section) • **SES**—Severely errored seconds • **UAS**—Unavailable seconds • **YELLOW**—Errors at the remote site receiver	**extensive**
Line encoding	Line encoding used: **B8ZS** or **AMI**.	All levels
Buildout	Buildout setting.	All levels
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Line encoding**—Line encoding used: **B8ZS** or **AMI**. • **Byte encoding**—Byte encoding used: **Nx64K** or **Nx56K**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**. • **Idle cycle Flag**—Idle cycle flags. • **Start end Flag**—Start and end flag.	**extensive**

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Table 63: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS0 or DS1 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface; values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	**All levels**
Encapsulation	Encapsulation on the logical interface.	**All levels**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, or **mpls**.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none

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Table 63: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces extensive (CT1)

```
user@host> show interfaces extensive ct1-0/1/1
Physical interface: ct1-0/1/1, Enabled, Physical link is Up
   Interface index: 145, SNMP ifIndex: 32, Generation: 28
   Link-level type: Controller, Clocking: Internal, Speed: T1,
   Loopback: None, Framing: ESF, Parent: None
 Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps 16384
   Link flags     : None
   Hold-times     : Up 0 ms, Down 0 ms
   CoS queues     : 4 supported
   Last flapped   : 2005-08-17 11:47:09 PDT (1d 03:38 ago)
   Statistics last cleared: 2005-08-18 15:25:37 PDT (00:00:27 ago)
   DS1   alarms   : None
   DS1   defects  : None
   T1  media:            Seconds        Count  State
     SEF                       0            0  OK
     BEE                       0            0  OK
     AIS                       0            0  OK
     LOF                       0            0  OK
     LOS                       0            0  OK
     YELLOW                    0            0  OK
     BPV                       0            0
     EXZ                       0            0
     LCV                       0            0
     PCV                       0            0
     CS                        0            0
     LES                       0
     ES                        0
     SES                       0
     SEFS                      0
     BES                       0
```

```
    UAS                      0
    Line encoding: B8ZS
    Buildout       : 0 to 132 feet
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
```

show interfaces extensive (T1)

```
user@host> show interfaces extensive t1-0/2/0
Physical interface: t1-0/2/0, Enabled, Physical link is Up
   Interface index: 161, SNMP ifIndex: 33, Generation: 61
   Link-level type: PPP, MTU: 1504, Speed: T1, Loopback: None, FCS: 16,
   Parent: ct1-0/2/0 Interface index 148
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps 16384
   Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
   Hold-times     : Up 0 ms, Down 0 ms
   CoS queues     : 4 supported
   Last flapped   : 2005-09-07 15:43:47 PDT (00:00:06 ago)
   Statistics last cleared: Never
   Traffic statistics:
    Input  bytes  :                   0                   0 bps
    Output bytes  :                  14                   0 bps
    Input  packets:                   0                   0 pps
    Output packets:                   1                   0 pps
   Input errors:
     Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
     Policed discards: 0, L3 incompletes: 0,
     L2 channel errors: 0, L2 mismatch timeouts: 0,
     HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
   Output errors:
     Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0,
     MTU errors: 0, Resource errors: 0
   Queue counters:       Queued packets  Transmitted packets Dropped packets
     0 best-effort                    0                   0               0
     1 expedited-fo                   0                   0               0
     2 assured-forw                   0                   0               0
     3 network-cont                   1                   1               0
   DS1   alarms   : None
```


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```
  DS1   defects  : None
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 1514, Runt threshold: 2
    Timeslots      : All active
    Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag:
    flags, Start end flag: shared
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)
```

show interfaces extensive (DS0)

```
user@host> show interfaces extensive ds-0/1/0:0
Physical interface: ds-0/1/0:1, Enabled, Physical link is Up
   Interface index: 157, SNMP ifIndex: 52, Generation: 46
   Link-level type: Frame-Relay, PPP, MTU: 1504, Clocking: Internal,
   Speed: 640kbps, Loopback: None, FCS:16,
   Parent: ct1-0/1/0 Interface index 143
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps 16384
   Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
   Hold-times     : Up 0 ms, Down 0 ms
   Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
   Keepalive statistics:
     Input : 8 (last seen 00:00:12 ago)
     Output: 8 (last sent 00:00:07 ago)
   LCP state: Opened
   NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
   mpls: Not-configured
   CHAP state: Not-configured
   CoS queues     : 4 supported
   Last flapped   : 2005-08-18 15:23:46 PDT (00:03:17 ago)
   Statistics last cleared: 2005-08-18 15:25:37 PDT (00:01:26 ago)
   Traffic statistics:
    Input  bytes  :                  840                    0 bps
    Output bytes  :                  912                    0 bps
    Input  packets:                   25                    0 pps
    Output packets:                   26                    0 pps
   Input errors:
     Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
     Policed discards: 0, L3 incompletes: 0,
```

```
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0,
    MTU errors: 0, Resource errors: 0
  Queue counters:       Queued packets  Transmitted packets Dropped packets
    0 best-effort                   0                    0               0
    1 expedited-fo                  0                    0               0
    2 assured-forw                  0                    0               0
    3 network-cont                 26                   26               0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 2
    Timeslots      : 1-10
    Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
    Start end flag: shared
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)
Logical interface ds-0/1/0:1.0 (Index 67) (SNMP ifIndex 53) (Generation 11)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 26, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 11.11.11.0/30, Local: 11.11.11.2, Broadcast: 11.11.11.3,
        Generation: 39
   DLCI 100
     Flags: Active, Dce-configured
     Total down time: 0 sec, Last down: Never
     Traffic statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
 DLCI statistics:
   Active DLCI  :2 Inactive DLCI  : 0
...
```


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show interfaces (T1, E1, or DS)

Syntax

show interfaces *interface-type*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

Display status information about the specified T1, E1, or DS interface.

Options

interface-type—On ACX Series, M Series, MX Series, and T Series routers, the T1 interface type is **t1-*fpc/pic/port***, whereas the E1 interface type is **e1-*fpc/pic/port***, and DS interface type is **ds-*fpc/pic/port*:<channel>**. On the J Series routers, the T1 interface type is **t1-*pim*/0/*port***, whereas the E1 interface type is **e1-*pim*/0/*port***.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

Related Documentation

- *Understanding Interfaces on ACX Series Universal Access Routers*

List of Sample Output

show interfaces (T1, IMA Link) on page 891
show interfaces (T1, PPP) on page 892
show interfaces detail (T1, PPP) on page 892
show interfaces extensive (T1 CRC Errors) on page 893
show interfaces extensive (T1, PPP) on page 893
show interfaces (E1, Frame Relay) on page 895
show interfaces detail (E1, Frame Relay) on page 896
show interfaces extensive (E1, Frame Relay) on page 897
show interfaces (E1, IMA Link) on page 899
show interfaces extensive (T1, TDM-CCC-SATOP) on page 900
show interfaces extensive (DS, TDM-CCC-CESoPSN) on page 901

Output Fields

Table 47 on page 581 lists the output fields for the **show interfaces** (T1 or E1) command. Output fields are listed in the approximate order in which they appear.

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Table 64: T1 or E1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used for the E1 interface on the link: **G704**, **G704-NO-CRC4**, or **Unframed**. The default is **G704**. Physical layer framing format used for the T1 interface on the link: **SF** and **ESF**. The default is **ESF**.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**

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Table 64: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
IMA Link alarms	Current active IMA link alarms, including the following: • **LIF** • **LODS** • **RFI-IMA** • **Tx-Mis-Connected** • **Tx-Unusable-FE** • **Rx-Unusable-FE** • **Link Fault**	**detail extensive** none
IMA Link defects	Current active IMA link defects, including the following: • **LIF** • **LODS** • **RFI-IMA** • **Tx-Mis-Connected** • **Tx-Unusable-FE** • **Rx-Unusable-FE** • **Link Fault**	**detail extensive** none

IMA Link state	Current active IMA link status, including the following:
	• **Line:** synchronized or not synchronized
	• **Near end:**—Status of near-end receive and transmit links
	  ◦ **Rx:** Usable or Unusable
	  ◦ **Tx:** Usable or Unusable
	• **Far end:**—Status of far-end receive and transmit links
	  ◦ **Rx:** Usable or Unusable
	  ◦ **Tx:** Usable or Unusable
		detail extensive none

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Table 64: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
IMA link media	IMA Link Media Status, which provides the seconds and count state for the following link media parameters: • LIF • LODS • Err-ICP • IV • Rx-FC • Tx-FC • FE-Defects • FE-Rx-FC • FE-Tx-FC • Rx-ICP • Rx-Stuff • Tx-ICP • Tx-Stuff • Rx-SES • Rx-UAS • Rx-UUS • Tx-UUS • FE-Rx-SES • FE-Rx-UAS • FE-Rx-UUS • FE-Tx-UUS	**detail extensive** none
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

Keepalive statistics	(PPP and HDLC) Information about keepalive packets. (When no level of output is specified, the word **statistics** is not part of the field name and the **last seen** text is not displayed.)
	• **Input**—Number of keepalive packets received by PPP.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh*:*mm*:*ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh*:*mm*:*ss***.
		detail extensive none

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Table 64: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
LMI settings	(Frame Relay) Settings for Local Management Interface (LMI) which can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx*** seconds, where *value* can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) Local Management Interface (LMI) packet statistics: • **Input**—Number of packets coming in on the interface (***nn***) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh*:*mm*:*ss* ago)**. • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh*:*mm*:*ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communications equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 64: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no Local Management Interface (LMI) packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE.) Number of DLCIs configured from the DCE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) State of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response is not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Down**—CHAP authentication is incomplete (not yet completed or has failed). • **Not-configured**—CHAP is not configured on the interface. • **Opened**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago).**	**detail extensive** none

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Table 64: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS Queues	Number of CoS queues configured.	**detail extensive** none
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC or PIM. If the value of this field increments, the PIC or PIM is malfunctioning. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 64: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
DS1 alarms **DS1 defects**	E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see *Bellcore Telcordia GR-499-CORE*. • **AIS**—Alarm indication signal. • **LOF**—Loss of frame. • **LOS**—Loss of signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 64: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
T1 media or **E1 media**	Counts of T1 or E1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 or E1 media-specific error types are: • **SEF**—Severely errored framing • **BEE**—Bit error • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **YELLOW**—Errors at the remote site receiver • **CRC Major**—Cyclic redundancy check major alarm threshold exceeded • **CRC Minor**—Cyclic redundancy check minor alarm threshold exceeded • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CS**—Carrier state • **CRC**—Cyclic redundancy check • **FEBE**—Far-end block error (E1 only) • **LES**—Line error seconds • **ES**—Errored seconds • **BES**—Bursty errored seconds • **SES**—Severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
SAToP Configuration	Information about the SAToP configuration. • **payload-size**—Configure the payload size, in bytes (from 32 through 1024 bytes). • **idle-pattern**—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • **jitter-buffer-packets**—Number of packets in the jitter buffer (from 1 through 64 packets). • **jitter-buffer-latency**—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • **excessive-packet-loss-rate**—Set packet loss options. The options are **groups**, **sample-period**, and **threshold**. • **sample-period**—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • **threshold**—Percentile designating the threshold of excessive packet loss rate (1–100 percent).	**extensive**

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Table 64: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CESoPSN Configuration	Information about the CESoPSN configuration. • **packetization-latency**—Time required to create packets (from 1000 through 8000 microseconds). • **idle-pattern**—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • **jitter-buffer-packets**—Number of packets in the jitter buffer (from 1 through 64 packets). • **jitter-buffer-latency**—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • **excessive-packet-loss-rate**—Set packet loss options. The options are **sample-period** and **threshold**. • **sample-period**—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • **threshold**—Percentile designating the threshold of excessive packet loss rate (1–100 percent).	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Time slots configured on the interface. • **Buildout**—(T1 only) Buildout setting: 0-132, 133-265, 266-398, 399-531, or 532-655 feet. • **Timeslots**—Configured time slots for the interface. • **Byte encoding**—(T1 only) Byte encoding used: **Nx64K** or **Nx56K**. • **Line encoding**—Line encoding used. For T1, the value can be **B8ZS** or **AMI**. For E1, the value is **HDB3**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**. • **Idle cycle flag**—Idle cycle flags. • **Start end flag**—Start and end flag.	**extensive**
DS1 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**

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Table 64: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes a while (generally, less than 1 second) for this counter to stabilize.	**detail extensive**

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Table 64: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter normally stabilizes in less than 1 second.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, **mlfr**, or **mpls**.	**detail extensive** none
Multilink bundle	Interface name for the multilink bundle, if configured.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive** none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics** or (**Input packets, Output packets**). **Flags** can be one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **DCE-Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **DCE-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

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Table 64: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CE Info	Information related to the circuit emulation statistics. • **CE Tx**—Number of transmitted packets and bytes (TDM to PSN flow). • **CE Rx**—Number of received packets and bytes and forward bytes (PSN to TDM flow). • **CE Rx Forwarded**—Number of forwarded bytes. • **CE Strayed**—Number of stray packets. • **CE Lost**—Number of lost packets. • **CE Malformed**—Number of malformed packets • **CE Misinserted**—Number of misinserted packets. • **CE AIS dropped**—Number of dropped bytes due to buffer overrun (PSN to TDM). • **CE Dropped**—Number of dropped packets during resynchronization • **CE Overrun Events**—Number of overrun events. • **CE Underrun Events**—Number of underrun events.	**extensive**

Sample Output

show interfaces (T1, IMA Link)

```
user@host> show interfaces t1-1/0/0
  IMA Link alarms   : None
  IMA Link defects  : LIF, LODS
  IMA Link state:
    Line     : Not synchronized
    Near end : Rx: Unusable, Tx: Usable
    Far  end : Rx: Unusable, Tx: Usable
  IMA link media:          Seconds        Count  State
    LIF                                       0  OK
    LODS                                      0  OK
    Err-ICP                                   0  OK
    IV                                        0  OK
    Rx-FC                                     0  OK
    Tx-FC                                     0  OK
    FE-Defects                                0
    FE-Rx-FC                                  0
    FE-Tx-FC                                  0
    Rx-ICP                                    0
    Rx-Stuff                                  0
    Tx-ICP                                   11
    Tx-Stuff                                  0
    Rx-SES                    0
    Rx-UAS                    0
    Rx-UUS                    1
    Tx-UUS                    0
    FE-Rx-SES                 0
    FE-Rx-UAS                 0
    FE-Rx-UUS                 0
    FE-Tx-UUS                 0
```

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show interfaces (T1, PPP)

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:35 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 72 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None

  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255
```

show interfaces detail (T1, PPP)

```
user@host> show interfaces t1-1/1/0 detail
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:52 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                  798                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                   42                    0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0
```


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```
    2 assured-forw                 0                  0                  0

    3 network-cont                40                 40                  0

  DS1   alarms   : None
  DS1   defects  : None
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1
  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 14, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 18
```

show interfaces extensive (T1 CRC Errors)

```
user@host> show interfaces t1-3/2/0:1:1 extensive
Physical interface: t1-3/2/0:1:1, Enabled, Physical link is Down
  Interface index: 179, SNMP ifIndex: 79, Generation: 180
  :
  :
  DS1   alarms   : AIS, LOF, CRC Major, CRC Minor
  DS1   defects  : AIS, LOF, CRC Major, CRC Minor
  T1  media:            Seconds        Count  State
    SEF                       1            1  OK
    BEE                       1            1  OK
    AIS                    1128            1  Defect Active
    LOF                    1128            1  Defect Active
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    CRC Major               154            1  Defect Active
    CRC Minor               154            1  Defect Active
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CS                        0            0
    CRC                     154        15400
    ...
```

show interfaces extensive (T1, PPP)

```
user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
```

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```
CHAP state: Closed
CoS queues     : 4 supported, 4 in use
Last flapped   : 2005-12-05 08:43:06 PST (02:13:54 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                    0                    0 bps
 Output bytes  :                  817                   72 bps
 Input  packets:                    0                    0 pps
 Output packets:                   43                    0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

  Resource errors: 0
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort                    0                    0                    0

  1 expedited-fo                   0                    0                    0

  2 assured-forw                   0                    0                    0

  3 network-cont                  42                   42                    0

DS1   alarms   : None
DS1   defects  : None
T1  media:            Seconds        Count  State
  SEF                       1            1  OK
  BEE                       0            0  OK
  AIS                       0            0  OK
  LOF                       1            1  OK
  LOS                       0            0  OK
  YELLOW                    1            1  OK
  BPV                       1            1
  EXZ                       1            1
  LCV                       1        65535
  PCV                       1         1023
  CS                        0            0
  LES                       1
  ES                        1
  SES                       1
  SEFS                      1
  BES                       0
  UAS                       0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : All active
  Line encoding: B8ZS
  Buildout       : 0 to 132 feet
  Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
  Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1
Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 1 (0x00)
```


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```
  CoS information:
    CoS transmit queue       Bandwidth          Buffer   Priority    Limit
                          %          bps     %     usec
    0 best-effort        95      1459200    95        0        low    none
    3 network-control     5        76800     5        0        low    none

  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 14, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 18
```

show interfaces (E1, Frame Relay)

```
user@host> show interfaces e1-3/0/0
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 0 (never), Output: 11 (00:00:05 ago)
  DTE statistics:
    Enquiries sent                      : 10
    Full enquiries sent                 : 1
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
    Keepalive responses timedout        : 1
  CoS queues     : 8 supported
  Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None
  Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Input packets : 0
  Output packets: 0
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255
    DLCI 100
      Flags: Down, DCE-Unconfigured
      Total down time: 00:01:13 sec, Last down: 00:01:13 ago
      Input packets : 0
      Output packets: 0
```

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```
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces detail (E1, Frame Relay)

```
user@host> show interfaces e1-3/0/0 detail
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37, Generation: 69
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 12 (last sent 00:00:02 ago)
  DTE statistics:
    Enquiries sent                      : 10
    Full enquiries sent                 : 2
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
    Keepalive responses timedout        : 1
  CoS queues     : 8 supported
  Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                 225                  56 bps
   Input  packets:                   0                   0 pps
   Output packets:                  15                   0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 limited                       0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 real-plus                     0                   0                   0

    3 network-cont                 15                  15                   0

  DS1   alarms   : None
  DS1   defects  : None
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
```


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```
    Input  packets:                  0
    Output packets:                  0
  Local statistics:
    Input  bytes  :                  0
    Output bytes  :                  0
    Input  packets:                  0
    Output packets:                  0
  Transit statistics:
    Input  bytes  :                  0                   0 bps
    Output bytes  :                  0                   0 bps
    Input  packets:                  0                   0 pps
    Output packets:                  0                   0 pps
  Protocol inet, MTU: 1500, Generation: 32, Route table: 0
    Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
      Generation: 42
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:01:18 sec, Last down: 00:01:18 ago
    Traffic statistics:
     Input  bytes  :                  0
     Output bytes  :                  0
     Input  packets:                  0
     Output packets:                  0
DLCI statistics:
  Active DLCI  :0  Inactive DLCI  :1
```

show interfaces extensive (E1, Frame Relay)

```
user@host> show interfaces e1-3/0/0 extensive
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37, Generation: 69
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 12 (last sent 00:00:05 ago)
  DTE statistics:
    Enquiries sent                     : 10
    Full enquiries sent                : 2
    Enquiry responses received         : 0
    Full enquiry responses received    : 0
  DCE statistics:
    Enquiries received                 : 0
    Full enquiries received            : 0
    Enquiry responses sent             : 0
    Full enquiry responses sent        : 0
  Common statistics:
    Unknown messages received          : 0
    Asynchronous updates received      : 0
    Out-of-sequence packets received   : 0
    Keepalive responses timedout       : 1
  CoS queues     : 8 supported
  Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Statistics last cleared: Never
```

```
Traffic statistics:
 Input  bytes  :                    0                    0 bps
 Output bytes  :                  225                    0 bps
 Input  packets:                    0                    0 pps
 Output packets:                   15                    0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 17, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 limited                        0                    0                    0

  1 expedited-fo                   0                    0                    0

  2 real-plus                      0                    0                    0

  3 network-cont                  15                   15                    0

DS1   alarms   : None
DS1   defects  : None
E1  media:            Seconds        Count  State
  SEF                       0            0  OK
  BEE                       5            5  OK
  AIS                       0            0  OK
  LOF                     245           15  OK
  LOS                     245            4  OK
  YELLOW                    0           11  OK
  BPV                       0            0
  EXZ                       9            9
  LCV                       0            0
  PCV                       0            0
  CS                        0            0
  FEBE                      0            0
  LES                       0
  ES                        0
  SES                       0
  SEFS                      0
  BES                       0
  UAS                     271
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1506, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3, Data inversion: Disabled, Idle cycle flag: flags,
  Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 3, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue       Bandwidth          Buffer   Priority    Limit
                         %          bps     %     usec
  0 limited             95      1945600    95        0        low     none
  3 network-control      5       102400     5        0        low     none
Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
```


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```
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Traffic statistics:
   Input  bytes  :                   0
   Output bytes  :                   0
   Input  packets:                   0
   Output packets:                   0
  Local statistics:
   Input  bytes  :                   0
   Output bytes  :                   0
   Input  packets:                   0
   Output packets:                   0
  Transit statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
  Protocol inet, MTU: 1500, Generation: 32, Route table: 0
    Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
      Generation: 42
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:01:21 sec, Last down: 00:01:21 ago
    Traffic statistics:
     Input  bytes  :                  0
     Output bytes  :                  0
     Input  packets:                  0
     Output packets:                  0
DLCI statistics:
  Active DLCI  :0  Inactive DLCI  :1
```

show interfaces (E1, IMA Link)

```
user@host> show interfaces e1-1/0/0
  IMA Link alarms   : None
  IMA Link defects  : LIF, LODS
  IMA Link state:
    Line     : Not synchronized
    Near end : Rx: Unusable, Tx: Usable
    Far  end : Rx: Unusable, Tx: Usable
  IMA link media:          Seconds        Count  State
    LIF                                       0
    LODS                                      0
    Err-ICP                                   0
    IV                                        0
    Rx-FC                                     0
    Tx-FC                                     0
    FE-Defects                                0
    FE-Rx-FC                                  0
    FE-Tx-FC                                  0
    Rx-ICP                                    0
    Rx-Stuff                                  0
    Tx-ICP                                   11
    Tx-Stuff                                  0
    Rx-SES                    0
    Rx-UAS                    0
    Rx-UUS                    1
    Tx-UUS                    0
    FE-Rx-SES                 0
    FE-Rx-UAS                 0
```

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```
    FE-Rx-UUS                    0
    FE-Tx-UUS                    0
```

show interfaces extensive (T1, TDM-CCC-SATOP)

```
user@host>show interfaces t1-1/0/0:1:1 extensive
Physical interface: t1-1/0/0:1:1, Enabled, Physical link is Down
  Interface index: 153, SNMP ifIndex: 579, Generation: 817
  Link-level type: TDM-CCC-SATOP, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-1/0/0:1 Interface index 152
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2012-10-28 02:12:40 PDT (22:32:13 ago)
  Statistics last cleared: 2012-10-29 00:44:52 PDT (00:00:01 ago)
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                   0                    0                    0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  DS1   alarms   : None
  DS1   defects  : None
  T1  media:            Seconds        Count  State
    SEF                          0            0  OK
    BEE                          0            0  OK
    AIS                          0            0  OK
    LOF                          0            0  OK
    LOS                          0            0  OK
    YELLOW                       0            0  OK
    CRC Major                    0            0  OK
    CRC Minor                    0            0  OK
    BPV                          0            0
    EXZ                          0            0
    LCV                          0            0
    PCV                          0            0
    CS                           0            0
    CRC                          0            0
    LES                          0
    ES                           0
    SES                          0
    SEFS                         0
    BES                          0
    UAS                          0
  SAToP configuration:
    Payload size: 192
    Idle pattern: 0xFF
    Octet aligned: Disabled
```


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```
    Jitter buffer: packets: 8, latency: 7 ms, auto adjust: Disabled
    Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  SONET alarms    : None
  SONET defects   : AIS-V, RDI-V
  SONET vt:
    BIP-BIP2                      0            0
    REI-V                         0            0
    LOP-V                         0            0  OK
    AIS-V                         2            0  Defect Active
    RDI-V                         2            0  Defect Active
    UNEQ-V                        0            0  OK
    PLM-V                         0            0  OK
    ES-V                          0
    SES-V                         0
    UAS-V                         2
    ES-VFE                        0
    SES-VFE                       0
    UAS-VFE                       0
  Received SONET overhead:
V5      : 0x07
V5(cmp) : 0x02
  Transmitted SONET overhead:
V5      : 0x02
  Packet Forwarding Engine configuration:
    Destination slot: 1
  CoS information:
    Direction : Output
    CoS transmit queue               Bandwidth               Buffer Priority
Limit
                              %            bps     %           usec
    0 best-effort            95        1459200    95              0      low
none
    3 network-control         5          76800     5              0      low
none

  Logical interface t1-1/0/0:1:1.0 (Index 69) (SNMP ifIndex 580) (Generation 525)

    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-SATOP
  CE info               Packets        Bytes  Count
    CE Tx                  1005        192960
    CE Rx                  1004        192768
    CE Rx Forwarded                        0
    CE Strayed                0
    CE Lost                   0
    CE Malformed              0
    CE Misinserted            0
    CE AIS dropped            0
    CE Dropped             1005        192960
    CE Overrun Events                      0
    CE Underrun Events                     0
    Protocol ccc, MTU: 1504, Generation: 814, Route table: 0
      Flags: Is-Primary
```

show interfaces extensive (DS, TDM-CCC-CESoPSN)

```
user@host>show interfaces ds-1/0/0:1:1:1 extensive
Physical interface: ds-1/0/0:1:1:1, Enabled, Physical link is Down
  Interface index: 154, SNMP ifIndex: 597, Generation: 819
```

```
  Link-level type: TDM-CCC-CESoPSN, MTU: 1504, Speed: 1536kbps, Loopback: None,
FCS: 16, Parent: ct1-1/0/0:1:1 Interface index 153
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2012-10-29 00:49:03 PDT (00:00:35 ago)
  Statistics last cleared: Never
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 assured-forw                  0                   0                   0

    3 network-cont                  0                   0                   0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  CESoPSN configuration:
    Packetization latency: 1000 us
    Idle pattern: 0xFF
    Jitter buffer: packets: 8, latency: 8 ms, auto adjust: Disabled
    Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 1
  CoS information:
    Direction : Output
    CoS transmit queue              Bandwidth               Buffer Priority
Limit
                                %           bps     %           usec
    0 best-effort              95       1459200    95              0      low
none
    3 network-control           5         76800     5              0      low
none

  Logical interface ds-1/0/0:1:1:1.0 (Index 69) (SNMP ifIndex 598) (Generation
549)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-CESoPSN
  CE info               Packets        Bytes  Count
    CE Tx                     0            0
    CE Rx                 35712        6856704
    CE Rx Forwarded                        0
    CE Strayed                0
    CE Lost                   0
    CE Malformed              0
    CE Misinserted            0
    CE AIS dropped            0
    CE Dropped                0            0
    CE Overrun Events                         0
    CE Underrun Events                        1
```


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```
Protocol ccc, MTU: 1504, Generation: 857, Route table: 0
  Flags: Is-Primary
```

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show interfaces (Channelized DS3-to-DS0)

Syntax show interfaces ds-*fpc/pic/port:t1channel:ds0channel*
<brief | detail | extensive>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information about the specified channelized DS3-to-DS0 interface.

Options

ds-*fpc/pic/port:t1channel:ds0channel*—Display standard information about the specified channelized DS3-to-DS0 interface.

brief | detail | extensive—(Optional) Display the specified level of output interface.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output show interfaces extensive (Channelized DS3-to-DS0) on page 912

Output Fields Table 41 on page 477 lists the output fields for the **show interfaces** (all Channelized DS3 interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 65: Channelized DS3 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

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Table 65: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Mode	Whether C-bit parity mode or M13 mode is enabled.	All levels
Framing	Physical layer framing format used on the link. It can be **ESF** or **SF**. The default is **ESF**.	All levels
Parent	(Channelized IQ interfaces only) Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets that a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 65: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	(PPP and HDLC) Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

LMI settings	(Frame Relay) Settings for Local Management Interface (LMI) can be either **ANSI LMI settings** or **ITU LMI settings**. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value***, *value*, *value*...*xx* seconds, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) LMI packet statistics: • **Input**—Number of packets coming in on the interface (*nn*) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)**. • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last seen *hh:mm:ss* ago)**.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none

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Table 65: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the**Success** state. (Most likely with RADIUS authentication). • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped: *year-month-day hour:minute:second timezone hh:mm:ss* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface. • **Input packets, Output packets**—Number of packets received and transmitted on the interface.	**detail extensive**

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Table 65: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Giants**—Number of frames received that are larger than the giant threshold. • **Runts**—Number of frames received that are smaller than the runt threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Counter increments when the software could not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • **HS link CRC errors**—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces.	**extensive**
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware.	**extensive**

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Table 65: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS1 alarms **DS1 defects**	Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none
T1 media	Counts of T1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 media-specific error types can be: • **SEF**—Severely errored framing • **BEE**—Bit error event • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **YELLOW**—Errors at the remote site receiver • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CS**—Carrier state • **LES**—Line error seconds • **ES**—Errored seconds • **SEFS**—Severely errored framing seconds (section) • **SES**—Severely errored seconds • **BES**—Bit error seconds • **UAS**—Unavailable seconds	**extensive**

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Table 65: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS3 media	Counts of T3 media-specific errors. For detailed definitions of the T3 (DS-3) error events (BPV, EXZ, LCV, PCV, and CCV) and performance parameters (LES, PES, PSES, CES, CSES, SEFS, and UAS), see RFC 2496. • **PLL Lock**—Phase-locked loop out of lock • **Reframing**—Frame alignment recovery time • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **IDLE**—Idle code detected • **YELLOW**—Remote defect indication • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CCV**—C-bit coding violation • **LES**—Line error seconds • **PES**—P-bit errored seconds • **PSES**—P-bit errored seconds (section) • **CES**—C-bit errored seconds • **CSES**—C-bit severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Byte encoding**—Byte encoding used: **Nx64K** or **Nx56K**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**	**extensive**
Interface transmit queues	Name of the transmit queues and their associated statistics for each DS1 channel on the Channelized DS3-to-DS1 PIC. • **B/W**—Queue bandwidth as a percentage of the total interface bandwidth. • **WRR**—Weighted round-robin (in percent). • **Packets**—Number of packets transmitted. • **Bytes**—Number of bytes transmitted. • **Drops**—Number of packets dropped. • **Errors**—Number of packet errors.	**extensive**

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Table 65: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS1 or DS3 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface; values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Bandwidth	Bandwidth configured on the interface.	All levels
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, **mpls**.	**detail extensive** none

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Table 65: Channelized DS3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive** none
Redundant Link	(LSQ redundancy) Backup link for Link Services IQ redundancy.	**detail extensive** none

Sample Output

show interfaces extensive (Channelized DS3-to-DS0)

```
user@host> show interfaces ds-0/0/0:0:0 extensive
Physical interface: ds-0/0/0:0:0, Enabled, Physical link is Up
  Interface index: 174, SNMP ifIndex: 4298, Generation: 177
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps, FCS: 16,
  Mode: C/Bit parity, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 280 (last seen 00:00:09 ago)
    Output: 286 (last sent 00:00:00 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Not-configured
  Last flapped   : 2002-05-23 17:53:29 PDT (00:46:46 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                 6814                   16 bps
   Output bytes  :                28840                   72 bps
   Input  packets:                  568                    0 pps
   Output packets:                  893                    0 pps
  Input errors:
```


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```
  Errors: 0, Drops: 0, Framing errors: 39, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 2, L2 mismatch timeouts: 0,
  HS link CRC errors: 0
Output errors:
  Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
DS1   alarms   : None
DS3   alarms   : None
DS1   defects  : None
DS3   defects  : None
T1  media:            Seconds        Count  State
  SEF                       0            0  OK
  BEE                       5            1  OK
  AIS                       0            0  OK
  LOF                       0            0  OK
  LOS                       0            0  OK
  YELLOW                   17            1  OK
  BPV                       0            0
  EXZ                       0            0
  LCV                       5        27765
  PCV                       0            0
  CS                        0            0
  LES                       0
  ES                        0
  SES                       5
  SEFS                     10
  BES                       0
  UAS                       0
DS3 media:            Seconds        Count  State
  PLL Lock                  0            0  OK
  Reframing                 0            0  OK
  AIS                       0            0  OK
  LOF                       0            0  OK
  LOS                       0            0  OK
  IDLE                      0            0  OK
  YELLOW                    0            0  OK
  BPV                       1        65535
  EXZ                       1        65535
  LCV                       2       131070
  PCV                       1         1825
  CCV                       0            0
  LES                       1
  PES                       1
  PSES                      1
  CES                       0
  CSES                      0
  SEFS                      0
  UAS                       0
Interface transmit queues:
            B/W  WRR       Packets        Bytes        Drops       Errors
  Queue0     95   95             0            0            0            0
  Queue1      5    5           893        28840            0            0
HDLC configuration:
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : 1-10
  Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, Induced error rate: 10e-0
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
```

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```
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 2 (0x01)
  CoS information:    CoS transmit queue             Bandwidth           Buffer
Priority   Limit
                               %          bps   %         usec
    0 best-effort             95       608000  95            0      low    none
    3 network-control          5        32000   5            0      low    none
 Logical interface ds-0/0/0:0:0.0 (Index 5) (SNMP ifIndex 4299)
  (Generation 943)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 949, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 18.18.18.1, Local: 18.18.18.2, Broadcast: Unspecified,
        Generation: 1849
```


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show interfaces (Channelized DS3-to-DS1)

Syntax show interfaces t1-*fpc/pic/port*:*t1channel*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display status information about the specified channelized DS3-to-DS1 interface.

Options **t1-*fpc/pic/port*:*t1channel***—Display standard information about the specified channelized DS3-to-DS1 interface.

brief | detail | extensive | terse—(Optional) Display brief interface information.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level view

List of Sample Output show interfaces extensive (channelized DS3-to-DS1) on page 915

Output Fields See the output field table for the show interfaces (Channelized DS3-to-DS0) command.

Sample Output

show interfaces extensive (channelized DS3-to-DS1)

```
user@host> show interfaces t1-0/0/0:0 extensive
Physical interface: t1-0/0/0:0, Enabled, Physical link is Up
  Interface index: 210, SNMP ifIndex: 14, Generation: 2977
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Mode: C/Bit parity, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 30 (last seen 00:00:05 ago)
    Output: 29 (last sent 00:00:00 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
  Not-configured
```

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```
CHAP state: Not-configured
Last flapped   : 2002-05-23 17:30:12 PDT (17:29:43 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                  944                   16 bps
 Output bytes  :                 1162                   16 bps
 Input  packets:                   66                    0 pps
 Output packets:                   82                    0 pps
Input errors:
  Errors: 1, Drops: 0, Framing errors: 1, Policed discards: 8,
  L3 incompletes: 0, L2 channel errors: 1, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0
Output errors:
  Carrier transitions: 3, Errors: 0, Drops: 0, Aged packets: 0
DS1   alarms   : None
DS3   alarms   : None
DS1   defects  : None
DS3   defects  : None
T1  media:            Seconds        Count  State
  SEF                       0            0  OK
  BEE                      11            5  OK
  AIS                      28            1  OK
  LOF                      27            1  OK
  LOS                       0            0  OK
  YELLOW                   23            1  OK
  BPV                       0            0
  EXZ                       0            0
  LCV                      11        20574
  PCV                       0            0
  CS                        0            0
  LES                      28
  ES                       28
  SES                      39
  SEFS                     50
  BES                       0
  UAS                       0
DS3 media:            Seconds        Count  State
  PLL Lock                  0            0  OK
  Reframing                 0            0  OK
  AIS                       0            0  OK
  LOF                       1            1  OK
  LOS                       1            1  OK
  IDLE                      0            0  OK
  YELLOW                    0            0  OK
  BPV                       2       131070
  EXZ                       3        49910
  LCV                       5       180980
  PCV                       2          327
  CCV                      12       264558
  LES                       3
  PES                       3
  PSES                      2
  CES                      13
  CSES                     13
  SEFS                      1
  UAS                      35
Interface transmit queues:
            B/W  WRR       Packets        Bytes        Drops       Errors
  Queue0     95   95             0            0            0            0
  Queue1      5    5            82         1162            0            0
HDLC configuration:
```


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```
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : 1-10
  Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, Induced error rate: 10e-0
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 2 (0x00)  CoS information:
  CoS transmit queue             Bandwidth           Buffer Priority   Limit
                            %          bps   %         usec
  0 best-effort            95       608000  95            0      low    none
  3 network-control         5        32000   5            0      low    none
Logical interface t1-0/0/0:0.0 (Index 11) (SNMP ifIndex 23) (Generation 497)
  Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
  Bandwidth: 0
  Protocol inet, MTU: 1500, Generation: 576, Route table: 0
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 21.21.21.2, Local: 21.21.21.1, Broadcast: Unspecified,
      Generation: 977
```

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show interfaces (Channelized T3 IQ)

Syntax

show interfaces (ct3-*fpc/pic/port* | *type-fpc/pic/port*<:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

(M Series and T Series routers only) Display status information about the specified channelized T3 IQ interface.

Options

type-fpc/pic/port*:*channel—Interface type. With optional corresponding channel levels, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized T3 IQ interface, ***type*** is **ct3**.
- ***type-fpc/pic/port*:*channel***—For the clear channel, ***type*** is **t3**. At the first level of channelization, ***type*** can be **ct1** or **t1**.
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** is **ds**.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces extensive (Channelized T3 IQ) (Physical) on page 919
show interfaces extensive (Channelized T1 on Channelized T3 IQ) on page 919
show interfaces extensive (DS0 on Channelized T3 IQ) on page 919

Output Fields

See the output field table for the show interfaces (Channelized T1 IQ) command.

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Sample Output

show interfaces extensive (Channelized T3 IQ) (Physical)

```
user@host> show interfaces extensive ct3-0/0/1
Physical interface: ct3-0/0/1, Enabled, Physical link is Up
  Interface index: 30, SNMP ifIndex: 317, Generation: 29
  Link-level type: Controller, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (Channelized T1 on Channelized T3 IQ)

```
user@host> show interfaces extensive ct1-0/0/1:2
Physical interface: ct1-0/0/1:2, Enabled, Physical link is Up
  Interface index: 175, SNMP ifIndex: 1505, Generation: 174
  Link-level type: Controller, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF, Parent: ct3-0/0/1 (Index 32)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : None
...
```

show interfaces extensive (DS0 on Channelized T3 IQ)

```
user@host> show interfaces extensive ds-0/0/1:2:1
Physical interface: ds-0/0/1:2:1, Enabled, Physical link is Up
  Interface index: 176, SNMP ifIndex: 1563, Generation: 175
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: 640kbps,
  Loopback: None, FCS: 16, Parent: ct1-0/0/1:2(Index 175)
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
...
```

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show interfaces (T1, E1, or DS)

Syntax

show interfaces *interface-type*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

Display status information about the specified T1, E1, or DS interface.

Options

interface-type—On ACX Series, M Series, MX Series, and T Series routers, the T1 interface type is **t1-*fpc/pic/port***, whereas the E1 interface type is **e1-*fpc/pic/port***, and DS interface type is **ds-*fpc/pic/port*:<channel>**. On the J Series routers, the T1 interface type is **t1-*pim*/0/*port***, whereas the E1 interface type is **e1-*pim*/0/*port***.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

Related Documentation

- *Understanding Interfaces on ACX Series Universal Access Routers*

List of Sample Output

show interfaces (T1, IMA Link) on page 932
show interfaces (T1, PPP) on page 933
show interfaces detail (T1, PPP) on page 933
show interfaces extensive (T1 CRC Errors) on page 934
show interfaces extensive (T1, PPP) on page 934
show interfaces (E1, Frame Relay) on page 936
show interfaces detail (E1, Frame Relay) on page 937
show interfaces extensive (E1, Frame Relay) on page 938
show interfaces (E1, IMA Link) on page 940
show interfaces extensive (T1, TDM-CCC-SATOP) on page 941
show interfaces extensive (DS, TDM-CCC-CESoPSN) on page 942

Output Fields

Table 47 on page 581 lists the output fields for the **show interfaces** (T1 or E1) command. Output fields are listed in the approximate order in which they appear.

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Table 66: T1 or E1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used for the E1 interface on the link: **G704**, **G704-NO-CRC4**, or **Unframed**. The default is **G704**. Physical layer framing format used for the T1 interface on the link: **SF** and **ESF**. The default is **ESF**.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**

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Table 66: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
IMA Link alarms	Current active IMA link alarms, including the following: • **LIF** • **LODS** • **RFI-IMA** • **Tx-Mis-Connected** • **Tx-Unusable-FE** • **Rx-Unusable-FE** • **Link Fault**	**detail extensive** none
IMA Link defects	Current active IMA link defects, including the following: • **LIF** • **LODS** • **RFI-IMA** • **Tx-Mis-Connected** • **Tx-Unusable-FE** • **Rx-Unusable-FE** • **Link Fault**	**detail extensive** none

IMA Link state	Current active IMA link status, including the following:
	• **Line:** synchronized or not synchronized
	• **Near end:**—Status of near-end receive and transmit links
	  ◦ **Rx:** Usable or Unusable
	  ◦ **Tx:** Usable or Unusable
	• **Far end:**—Status of far-end receive and transmit links
	  ◦ **Rx:** Usable or Unusable
	  ◦ **Tx:** Usable or Unusable
		detail extensive none

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Table 66: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
IMA link media	IMA Link Media Status, which provides the seconds and count state for the following link media parameters: • LIF • LODS • Err-ICP • IV • Rx-FC • Tx-FC • FE-Defects • FE-Rx-FC • FE-Tx-FC • Rx-ICP • Rx-Stuff • Tx-ICP • Tx-Stuff • Rx-SES • Rx-UAS • Rx-UUS • Tx-UUS • FE-Rx-SES • FE-Rx-UAS • FE-Rx-UUS • FE-Tx-UUS	**detail extensive** none
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

Keepalive statistics	(PPP and HDLC) Information about keepalive packets. (When no level of output is specified, the word **statistics** is not part of the field name and the **last seen** text is not displayed.)
	• **Input**—Number of keepalive packets received by PPP.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

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Table 66: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
LMI settings	(Frame Relay) Settings for Local Management Interface (LMI) which can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx*** seconds, where *value* can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) Local Management Interface (LMI) packet statistics: • **Input**—Number of packets coming in on the interface (***nn***) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh*:*mm*:*ss* ago)**. • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh*:*mm*:*ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communications equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 66: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no Local Management Interface (LMI) packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE.) Number of DLCIs configured from the DCE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) State of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response is not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Down**—CHAP authentication is incomplete (not yet completed or has failed). • **Not-configured**—CHAP is not configured on the interface. • **Opened**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago).**	**detail extensive** none

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Table 66: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS Queues	Number of CoS queues configured.	**detail extensive** none
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC or PIM. If the value of this field increments, the PIC or PIM is malfunctioning. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 66: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
DS1 alarms **DS1 defects**	E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see *Bellcore Telcordia GR-499-CORE*. • **AIS**—Alarm indication signal. • **LOF**—Loss of frame. • **LOS**—Loss of signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 66: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
T1 media or **E1 media**	Counts of T1 or E1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 or E1 media-specific error types are: • **SEF**—Severely errored framing • **BEE**—Bit error • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **YELLOW**—Errors at the remote site receiver • **CRC Major**—Cyclic redundancy check major alarm threshold exceeded • **CRC Minor**—Cyclic redundancy check minor alarm threshold exceeded • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—Pulse code violation • **CS**—Carrier state • **CRC**—Cyclic redundancy check • **FEBE**—Far-end block error (E1 only) • **LES**—Line error seconds • **ES**—Errored seconds • **BES**—Bursty errored seconds • **SES**—Severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
SAToP Configuration	Information about the SAToP configuration. • **payload-size**—Configure the payload size, in bytes (from 32 through 1024 bytes). • **idle-pattern**—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • **jitter-buffer-packets**—Number of packets in the jitter buffer (from 1 through 64 packets). • **jitter-buffer-latency**—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • **excessive-packet-loss-rate**—Set packet loss options. The options are **groups**, **sample-period**, and **threshold**. • **sample-period**—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • **threshold**—Percentile designating the threshold of excessive packet loss rate (1–100 percent).	**extensive**

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Table 66: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CESoPSN Configuration	Information about the CESoPSN configuration. • **packetization-latency**—Time required to create packets (from 1000 through 8000 microseconds). • **idle-pattern**—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • **jitter-buffer-packets**—Number of packets in the jitter buffer (from 1 through 64 packets). • **jitter-buffer-latency**—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • **excessive-packet-loss-rate**—Set packet loss options. The options are **sample-period** and **threshold**. • **sample-period**—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • **threshold**—Percentile designating the threshold of excessive packet loss rate (1–100 percent).	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Time slots configured on the interface. • **Buildout**—(T1 only) Buildout setting: 0-132, 133-265, 266-398, 399-531, or 532-655 feet. • **Timeslots**—Configured time slots for the interface. • **Byte encoding**—(T1 only) Byte encoding used: **Nx64K** or **Nx56K**. • **Line encoding**—Line encoding used. For T1, the value can be **B8ZS** or **AMI**. For E1, the value is **HDB3**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**. • **Idle cycle flag**—Idle cycle flags. • **Start end flag**—Start and end flag.	**extensive**
DS1 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**

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Table 66: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes a while (generally, less than 1 second) for this counter to stabilize.	**detail extensive**

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Table 66: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter normally stabilizes in less than 1 second.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, **mlfr**, or **mpls**.	**detail extensive** none
Multilink bundle	Interface name for the multilink bundle, if configured.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive** none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics** or (**Input packets, Output packets**). **Flags** can be one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **DCE-Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **DCE-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

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Table 66: T1 or E1 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CE Info	Information related to the circuit emulation statistics. • **CE Tx**—Number of transmitted packets and bytes (TDM to PSN flow). • **CE Rx**—Number of received packets and bytes and forward bytes (PSN to TDM flow). • **CE Rx Forwarded**—Number of forwarded bytes. • **CE Strayed**—Number of stray packets. • **CE Lost**—Number of lost packets. • **CE Malformed**—Number of malformed packets • **CE Misinserted**—Number of misinserted packets. • **CE AIS dropped**—Number of dropped bytes due to buffer overrun (PSN to TDM). • **CE Dropped**—Number of dropped packets during resynchronization • **CE Overrun Events**—Number of overrun events. • **CE Underrun Events**—Number of underrun events.	**extensive**

Sample Output

show interfaces (T1, IMA Link)

```
user@host> show interfaces t1-1/0/0
  IMA Link alarms   : None
  IMA Link defects  : LIF, LODS
  IMA Link state:
    Line     : Not synchronized
    Near end : Rx: Unusable, Tx: Usable
    Far  end : Rx: Unusable, Tx: Usable
  IMA link media:          Seconds        Count  State
    LIF                                       0  OK
    LODS                                      0  OK
    Err-ICP                                   0  OK
    IV                                        0  OK
    Rx-FC                                     0  OK
    Tx-FC                                     0  OK
    FE-Defects                                0
    FE-Rx-FC                                  0
    FE-Tx-FC                                  0
    Rx-ICP                                    0
    Rx-Stuff                                  0
    Tx-ICP                                   11
    Tx-Stuff                                  0
    Rx-SES                    0
    Rx-UAS                    0
    Rx-UUS                    1
    Tx-UUS                    0
    FE-Rx-SES                 0
    FE-Rx-UAS                 0
    FE-Rx-UUS                 0
    FE-Tx-UUS                 0
```


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show interfaces (T1, PPP)

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:35 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 72 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None

  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255
```

show interfaces detail (T1, PPP)

```
user@host> show interfaces t1-1/1/0 detail
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:13:52 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                 798                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                  42                   0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                   0                   0

    1 expedited-fo                   0                   0                   0
```

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```
    2 assured-forw                 0                 0                 0

    3 network-cont                40                40                 0

  DS1   alarms   : None
  DS1   defects  : None
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1
  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 14, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 18
```

show interfaces extensive (T1 CRC Errors)

```
user@host> show interfaces t1-3/2/0:1:1 extensive
Physical interface: t1-3/2/0:1:1, Enabled, Physical link is Down
  Interface index: 179, SNMP ifIndex: 79, Generation: 180
  :
  :
  DS1   alarms   : AIS, LOF, CRC Major, CRC Minor
  DS1   defects  : AIS, LOF, CRC Major, CRC Minor
  T1  media:            Seconds        Count  State
    SEF                       1            1  OK
    BEE                       1            1  OK
    AIS                    1128            1  Defect Active
    LOF                    1128            1  Defect Active
    LOS                       0            0  OK
    YELLOW                    0            0  OK
    CRC Major               154            1  Defect Active
    CRC Minor               154            1  Defect Active
    BPV                       0            0
    EXZ                       0            0
    LCV                       0            0
    PCV                       0            0
    CS                        0            0
    CRC                     154        15400
    ...
```

show interfaces extensive (T1, PPP)

```
user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
```


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```
CHAP state: Closed
CoS queues     : 4 supported, 4 in use
Last flapped   : 2005-12-05 08:43:06 PST (02:13:54 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                    0                    0 bps
 Output bytes  :                  817                   72 bps
 Input  packets:                    0                    0 pps
 Output packets:                   43                    0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

  Resource errors: 0
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort                   0                    0                    0

  1 expedited-fo                  0                    0                    0

  2 assured-forw                  0                    0                    0

  3 network-cont                 42                   42                    0

DS1   alarms   : None
DS1   defects  : None
T1  media:            Seconds        Count  State
  SEF                       1            1  OK
  BEE                       0            0  OK
  AIS                       0            0  OK
  LOF                       1            1  OK
  LOS                       0            0  OK
  YELLOW                    1            1  OK
  BPV                       1            1
  EXZ                       1            1
  LCV                       1        65535
  PCV                       1         1023
  CS                        0            0
  LES                       1
  ES                        1
  SES                       1
  SEFS                      1
  BES                       0
  UAS                       0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : All active
  Line encoding: B8ZS
  Buildout       : 0 to 132 feet
  Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
  Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1
Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 1 (0x00)
```

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```
  CoS information:
    CoS transmit queue       Bandwidth          Buffer   Priority    Limit
                          %          bps     %     usec
    0 best-effort        95      1459200    95        0        low    none
    3 network-control     5        76800     5        0        low    none

  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 14, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 18
```

show interfaces (E1, Frame Relay)

```
user@host> show interfaces e1-3/0/0
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 0 (never), Output: 11 (00:00:05 ago)
  DTE statistics:
    Enquiries sent                      : 10
    Full enquiries sent                 : 1
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
    Keepalive responses timedout        : 1
  CoS queues     : 8 supported
  Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1   alarms   : None
  DS1   defects  : None
  Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Input packets : 0
  Output packets: 0
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255
    DLCI 100
      Flags: Down, DCE-Unconfigured
      Total down time: 00:01:13 sec, Last down: 00:01:13 ago
      Input packets : 0
      Output packets: 0
```


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```
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces detail (E1, Frame Relay)

```
user@host> show interfaces e1-3/0/0 detail
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37, Generation: 69
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 12 (last sent 00:00:02 ago)
  DTE statistics:
    Enquiries sent                      : 10
    Full enquiries sent                 : 2
    Enquiry responses received          : 0
    Full enquiry responses received     : 0
  DCE statistics:
    Enquiries received                  : 0
    Full enquiries received             : 0
    Enquiry responses sent              : 0
    Full enquiry responses sent         : 0
  Common statistics:
    Unknown messages received           : 0
    Asynchronous updates received       : 0
    Out-of-sequence packets received    : 0
    Keepalive responses timedout        : 1
  CoS queues     : 8 supported
  Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                 225                  56 bps
   Input  packets:                   0                   0 pps
   Output packets:                  15                   0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 limited                       0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 real-plus                     0                   0                   0

    3 network-cont                 15                  15                   0

  DS1   alarms   : None
  DS1   defects  : None
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
```

```
    Input  packets:                    0
    Output packets:                    0
  Local statistics:
    Input  bytes  :                    0
    Output bytes  :                    0
    Input  packets:                    0
    Output packets:                    0
  Transit statistics:
    Input  bytes  :                    0                    0 bps
    Output bytes  :                    0                    0 bps
    Input  packets:                    0                    0 pps
    Output packets:                    0                    0 pps
  Protocol inet, MTU: 1500, Generation: 32, Route table: 0
    Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
      Generation: 42
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:01:18 sec, Last down: 00:01:18 ago
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
DLCI statistics:
  Active DLCI  :0  Inactive DLCI  :1
```

show interfaces extensive (E1, Frame Relay)

```
user@host> show interfaces e1-3/0/0 extensive
Physical interface: e1-3/0/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 37, Generation: 69
  Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
  Loopback: None, FCS: 16, Framing: G704
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 12 (last sent 00:00:05 ago)
  DTE statistics:
    Enquiries sent                     : 10
    Full enquiries sent                : 2
    Enquiry responses received         : 0
    Full enquiry responses received    : 0
  DCE statistics:
    Enquiries received                 : 0
    Full enquiries received            : 0
    Enquiry responses sent             : 0
    Full enquiry responses sent        : 0
  Common statistics:
    Unknown messages received          : 0
    Asynchronous updates received      : 0
    Out-of-sequence packets received   : 0
    Keepalive responses timedout       : 1
  CoS queues     : 8 supported
  Last flapped   : 2005-11-30 14:50:34 PST (4d 20:33 ago)
  Statistics last cleared: Never
```


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```
Traffic statistics:
 Input  bytes  :                    0                    0 bps
 Output bytes  :                  225                    0 bps
 Input  packets:                    0                    0 pps
 Output packets:                   15                    0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 17, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 limited                        0                    0                    0

  1 expedited-fo                   0                    0                    0

  2 real-plus                      0                    0                    0

  3 network-cont                  15                   15                    0

DS1   alarms   : None
DS1   defects  : None
E1  media:            Seconds        Count  State
  SEF                       0            0  OK
  BEE                       5            5  OK
  AIS                       0            0  OK
  LOF                     245           15  OK
  LOS                     245            4  OK
  YELLOW                    0           11  OK
  BPV                       0            0
  EXZ                       9            9
  LCV                       0            0
  PCV                       0            0
  CS                        0            0
  FEBE                      0            0
  LES                       0
  ES                        0
  SES                       0
  SEFS                      0
  BES                       0
  UAS                     271
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1506, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3, Data inversion: Disabled, Idle cycle flag: flags,
  Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 3, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue       Bandwidth          Buffer   Priority    Limit
                         %          bps     %     usec
  0 limited             95      1945600    95        0        low     none
  3 network-control      5       102400     5        0        low     none
Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
```

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```
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                   0                    0 bps
     Output bytes  :                   0                    0 bps
     Input  packets:                   0                    0 pps
     Output packets:                   0                    0 pps
    Protocol inet, MTU: 1500, Generation: 32, Route table: 0
      Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
        Generation: 42
    DLCI 100
      Flags: Down, DCE-Unconfigured
      Total down time: 00:01:21 sec, Last down: 00:01:21 ago
      Traffic statistics:
       Input  bytes  :                  0
       Output bytes  :                  0
       Input  packets:                  0
       Output packets:                  0
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces (E1, IMA Link)

```
user@host> show interfaces e1-1/0/0
  IMA Link alarms   : None
  IMA Link defects  : LIF, LODS
  IMA Link state:
    Line     : Not synchronized
    Near end : Rx: Unusable, Tx: Usable
    Far  end : Rx: Unusable, Tx: Usable
  IMA link media:          Seconds        Count  State
    LIF                                       0
    LODS                                      0
    Err-ICP                                   0
    IV                                        0
    Rx-FC                                     0
    Tx-FC                                     0
    FE-Defects                                0
    FE-Rx-FC                                  0
    FE-Tx-FC                                  0
    Rx-ICP                                    0
    Rx-Stuff                                  0
    Tx-ICP                                   11
    Tx-Stuff                                  0
    Rx-SES                    0
    Rx-UAS                    0
    Rx-UUS                    1
    Tx-UUS                    0
    FE-Rx-SES                 0
    FE-Rx-UAS                 0
```


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```
    FE-Rx-UUS                   0
    FE-Tx-UUS                   0
```

show interfaces extensive (T1, TDM-CCC-SATOP)

```
user@host>show interfaces t1-1/0/0:1:1 extensive
Physical interface: t1-1/0/0:1:1, Enabled, Physical link is Down
  Interface index: 153, SNMP ifIndex: 579, Generation: 817
  Link-level type: TDM-CCC-SATOP, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-1/0/0:1 Interface index 152
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2012-10-28 02:12:40 PDT (22:32:13 ago)
  Statistics last cleared: 2012-10-29 00:44:52 PDT (00:00:01 ago)
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 assured-forw                  0                   0                   0

    3 network-cont                  0                   0                   0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  DS1   alarms   : None
  DS1   defects  : None
  T1  media:            Seconds        Count  State
    SEF                         0            0  OK
    BEE                         0            0  OK
    AIS                         0            0  OK
    LOF                         0            0  OK
    LOS                         0            0  OK
    YELLOW                      0            0  OK
    CRC Major                   0            0  OK
    CRC Minor                   0            0  OK
    BPV                         0            0
    EXZ                         0            0
    LCV                         0            0
    PCV                         0            0
    CS                          0            0
    CRC                         0            0
    LES                         0
    ES                          0
    SES                         0
    SEFS                        0
    BES                         0
    UAS                         0
  SAToP configuration:
    Payload size: 192
    Idle pattern: 0xFF
    Octet aligned: Disabled
```

```
    Jitter buffer: packets: 8, latency: 7 ms, auto adjust: Disabled
    Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  SONET alarms    : None
  SONET defects   : AIS-V, RDI-V
  SONET vt:
    BIP-BIP2                    0           0
    REI-V                       0           0
    LOP-V                       0           0  OK
    AIS-V                       2           0  Defect Active
    RDI-V                       2           0  Defect Active
    UNEQ-V                      0           0  OK
    PLM-V                       0           0  OK
    ES-V                        0
    SES-V                       0
    UAS-V                       2
    ES-VFE                      0
    SES-VFE                     0
    UAS-VFE                     0
  Received SONET overhead:
V5      : 0x07
V5(cmp) : 0x02
  Transmitted SONET overhead:
V5      : 0x02
  Packet Forwarding Engine configuration:
    Destination slot: 1
  CoS information:
    Direction : Output
    CoS transmit queue              Bandwidth              Buffer Priority
Limit
                              %           bps     %           usec
    0 best-effort            95       1459200    95              0      low
none
    3 network-control         5         76800     5              0      low
none

  Logical interface t1-1/0/0:1:1.0 (Index 69) (SNMP ifIndex 580) (Generation 525)

    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-SATOP
  CE info               Packets        Bytes  Count
    CE Tx                  1005       192960
    CE Rx                  1004       192768
    CE Rx Forwarded                       0
    CE Strayed                0
    CE Lost                   0
    CE Malformed              0
    CE Misinserted            0
    CE AIS dropped            0
    CE Dropped             1005       192960
    CE Overrun Events                      0
    CE Underrun Events                     0
    Protocol ccc, MTU: 1504, Generation: 814, Route table: 0
      Flags: Is-Primary
```

show interfaces extensive (DS, TDM-CCC-CESoPSN)

```
user@host>show interfaces ds-1/0/0:1:1:1 extensive
Physical interface: ds-1/0/0:1:1:1, Enabled, Physical link is Down
  Interface index: 154, SNMP ifIndex: 597, Generation: 819
```


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```
  Link-level type: TDM-CCC-CESoPSN, MTU: 1504, Speed: 1536kbps, Loopback: None,
FCS: 16, Parent: ct1-1/0/0:1:1 Interface index 153
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times     : Up 0 ms, Down 0 ms
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2012-10-29 00:49:03 PDT (00:00:35 ago)
  Statistics last cleared: Never
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 assured-forw                  0                   0                   0

    3 network-cont                  0                   0                   0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  CESoPSN configuration:
    Packetization latency: 1000 us
    Idle pattern: 0xFF
    Jitter buffer: packets: 8, latency: 8 ms, auto adjust: Disabled
    Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 1
  CoS information:
    Direction : Output
    CoS transmit queue              Bandwidth               Buffer Priority
Limit
                                %           bps     %           usec
    0 best-effort              95       1459200    95              0      low
none
    3 network-control           5         76800     5              0      low
none

  Logical interface ds-1/0/0:1:1:1.0 (Index 69) (SNMP ifIndex 598) (Generation
549)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-CESoPSN
  CE info               Packets        Bytes  Count
    CE Tx                     0            0
    CE Rx                 35712       6856704
    CE Rx Forwarded                        0
    CE Strayed                0
    CE Lost                   0
    CE Malformed              0
    CE Misinserted            0
    CE AIS dropped            0
    CE Dropped                0            0
    CE Overrun Events                      0
    CE Underrun Events                     1
```

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```
    Protocol ccc, MTU: 1504, Generation: 857, Route table: 0
      Flags: Is-Primary
```


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show interfaces (Channelized T1 IQ)

Syntax

show interfaces (ct1-*fpc/pic/port* | *type-fpc/pic/port*<:*channel*><:*channel*>)
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced in Junos OS Release 7.4.

Description

(M Series and T Series routers only) Display status information about the specified channelized T1 IQ interface.

Options

type-fpc/pic/port*:*channel—Interface type. With optional corresponding channel levels, the interface type can be one of the following:

- ***type-fpc/pic/port***—For the physical channelized T1 IQ interface, ***type*** is **ct1.**
- ***type-fpc/pic/port*:*channel***—For the clear channel, ***type*** is **t1**. At the first level of channelization, ***type*** can be **ct1** or **t1.**
- ***type-fpc/pic/port*:*channel*:*channel***—At the second level of channelization, ***type*** can be **ds**.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces extensive (CT1) on page 953
show interfaces extensive (T1) on page 954
show interfaces extensive (DS0) on page 955

Output Fields

Table 45 on page 551 lists the output fields for the **show interfaces** (Channelized T1 IQ and T3 IQ interfaces) command. Output fields are listed in the approximate order in which they appear.

Table 67: Channelized T1 IQ and T3 IQ show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels

Table 67: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Framing	Physical layer framing format used on the link. It can be **ESF** or **SF**. The default is **ESF**.	All levels
Parent	Name and interface index of the interface to which a particular child interface belongs. **None** indicates that this interface is the top level.	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	Configured settings for keepalives. • **interval** ***seconds***—The time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count** ***number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count** ***number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 67: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics	Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  ◦ **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

LMI settings	(Frame Relay) Settings for Local Management Interface (LMI) can be either **ANSI LMI settings** or **ITU LMI settings**. ANSI LMI settings is the default. The format is **(ANSI or ITU) LMI settings: *value*, *value*... *xx seconds***, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) LMI packet statistics: • **Input**—Number of packets coming in on the interface (***nn***) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)**. • **Output**—Number of packets sent out on the interface (***nn***) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh:mm:ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communication equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 67: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay) Number of DLCIs configured from the DCE, displayed only from the DTE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—LCP is not configured on the interface. • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Not-configured**—NCP is not configured on the interface. • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Chal-received**—Challenge was received but response not yet sent. • **Chap-Chal-sent**—Challenge was sent. • **Chap-Resp-received**—Response was received for the challenge sent, but CHAP has not yet moved into the**Success** state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response was sent for the challenge received. • **Closed**—CHAP authentication is incomplete. • **Failure**—CHAP authentication failed. • **Not-configured**—CHAP is not configured on the interface. • **Success**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*****hour:minute:second*** **ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none

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Table 67: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS queues	Number of CoS queues configured.	**detail extensive** none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface. • **Input packets, Output packets**—Number of packets received and transmitted on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Giants**—Number of frames received that are larger than the giant threshold. • **Runts**—Number of frames received that are smaller than the runt threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Counter increments when the software could not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Count of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Count of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC. If the value in this field increments, the PIC is malfunctioning. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 67: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly, (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets whose size exceeds the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
DS1 alarms DS1 defects	Media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. • **LOS**—Loss of signal. • **LOF**—Loss of frame. • **AIS**—Alarm indication signal. • **YLW**—Yellow alarm. Indicates errors at the remote site receiver.	**detail extensive** none

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Table 67: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
T1 media	Counts of T1 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than **OK** indicates a problem. The T1 media-specific error types can be: • **AIS**—Alarm indication signal • **BEE**—Bit error event • **BES**—Bit error seconds • **BPV**—Bipolar violation • **CS**—Carrier state • **ES**—Errored seconds • **EXZ**—Excessive zeros • **FEBE**—Far-end block error • **LCV**—Line code violation • **LES**—Line error seconds • **LOF**—Loss of frame • **LOS**—Loss of signal • **PCV**—Pulse code violation • **SEF**—Severely errored framing • **SEFS**—Severely errored framing seconds (section) • **SES**—Severely errored seconds • **UAS**—Unavailable seconds • **YELLOW**—Errors at the remote site receiver	**extensive**
Line encoding	Line encoding used: **B8ZS** or **AMI**.	All levels
Buildout	Buildout setting.	All levels
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Timeslots**—Configured time slots for the interface. • **Line encoding**—Line encoding used: **B8ZS** or **AMI**. • **Byte encoding**—Byte encoding used: **Nx64K** or **Nx56K**. • **Data inversion**—HDLC data inversion setting: **Enabled** or **Disabled**. • **Idle cycle Flag**—Idle cycle flags. • **Start end Flag**—Start and end flag.	**extensive**

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Table 67: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS0 or DS1 BERT configuration	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface; values are described in the "Logical Interface Flags" section under *Common Output Fields Description*.	**All levels**
Encapsulation	Encapsulation on the logical interface.	**All levels**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, or **mpls**.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none

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Table 67: Channelized T1 IQ and T3 IQ show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics**. **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **Dce-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces extensive (CT1)

```
user@host> show interfaces extensive ct1-0/1/1
Physical interface: ct1-0/1/1, Enabled, Physical link is Up
   Interface index: 145, SNMP ifIndex: 32, Generation: 28
   Link-level type: Controller, Clocking: Internal, Speed: T1,
   Loopback: None, Framing: ESF, Parent: None
 Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps 16384
   Link flags     : None
   Hold-times     : Up 0 ms, Down 0 ms
   CoS queues     : 4 supported
   Last flapped   : 2005-08-17 11:47:09 PDT (1d 03:38 ago)
   Statistics last cleared: 2005-08-18 15:25:37 PDT (00:00:27 ago)
   DS1   alarms   : None
   DS1   defects  : None
   T1  media:            Seconds        Count  State
     SEF                       0            0  OK
     BEE                       0            0  OK
     AIS                       0            0  OK
     LOF                       0            0  OK
     LOS                       0            0  OK
     YELLOW                    0            0  OK
     BPV                       0            0
     EXZ                       0            0
     LCV                       0            0
     PCV                       0            0
     CS                        0            0
     LES                       0
     ES                        0
     SES                       0
     SEFS                      0
     BES                       0
```

```
    UAS                      0
    Line encoding: B8ZS
    Buildout       : 0 to 132 feet
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, O.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
```

show interfaces extensive (T1)

```
user@host> show interfaces extensive t1-0/2/0
Physical interface: t1-0/2/0, Enabled, Physical link is Up
   Interface index: 161, SNMP ifIndex: 33, Generation: 61
   Link-level type: PPP, MTU: 1504, Speed: T1, Loopback: None, FCS: 16,
   Parent: ct1-0/2/0 Interface index 148
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps 16384
   Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                    : 43186
    Full enquiries sent               : 8515
    Enquiry responses received        : 43185
    Full enquiry responses received   : 8515
  DCE statistics:
    Enquiries received                : 0
    Full enquiries received           : 0
    Enquiry responses sent            : 0
    Full enquiry responses sent       : 0
  Common statistics:
    Unknown messages received         : 0
    Asynchronous updates received     : 0
    Out-of-sequence packets received  : 0
    Keepalive responses timedout      : 0
  Nonmatching DCE-end DLCIs:
          2
   Hold-times     : Up 0 ms, Down 0 ms
   CoS queues     : 4 supported
   Last flapped   : 2005-09-07 15:43:47 PDT (00:00:06 ago)
   Statistics last cleared: Never
   Traffic statistics:
    Input  bytes  :                   0                   0 bps
    Output bytes  :                  14                   0 bps
    Input  packets:                   0                   0 pps
    Output packets:                   1                   0 pps
   Input errors:
     Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
     Policed discards: 0, L3 incompletes: 0,
     L2 channel errors: 0, L2 mismatch timeouts: 0,
     HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
   Output errors:
     Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0,
     MTU errors: 0, Resource errors: 0
   Queue counters:       Queued packets  Transmitted packets Dropped packets
     0 best-effort                    0                   0               0
     1 expedited-fo                   0                   0               0
     2 assured-forw                   0                   0               0
     3 network-cont                   1                   1               0
   DS1   alarms   : None
```


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```
  DS1   defects  : None
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 1514, Runt threshold: 2
    Timeslots      : All active
    Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag:
    flags, Start end flag: shared
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)
```

show interfaces extensive (DS0)

```
user@host> show interfaces extensive ds-0/1/0:0
Physical interface: ds-0/1/0:1, Enabled, Physical link is Up
   Interface index: 157, SNMP ifIndex: 52, Generation: 46
   Link-level type: Frame-Relay, PPP, MTU: 1504, Clocking: Internal,
   Speed: 640kbps, Loopback: None, FCS:16,
   Parent: ct1-0/1/0 Interface index 143
   Device flags   : Present Running
   Interface flags: Point-To-Point SNMP-Traps 16384
   Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 51700 (00:00:02 ago), Output: 51701 (00:00:02 ago)
  DTE statistics:
    Enquiries sent                     : 43186
    Full enquiries sent                : 8515
    Enquiry responses received         : 43185
    Full enquiry responses received    : 8515
  DCE statistics:
    Enquiries received                 : 0
    Full enquiries received            : 0
    Enquiry responses sent             : 0
    Full enquiry responses sent        : 0
  Common statistics:
    Unknown messages received          : 0
    Asynchronous updates received      : 0
    Out-of-sequence packets received   : 0
    Keepalive responses timedout       : 0
  Nonmatching DCE-end DLCIs:
          2
   Hold-times     : Up 0 ms, Down 0 ms
   Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
   Keepalive statistics:
     Input : 8 (last seen 00:00:12 ago)
     Output: 8 (last sent 00:00:07 ago)
   LCP state: Opened
   NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
   mpls: Not-configured
   CHAP state: Not-configured
   CoS queues     : 4 supported
   Last flapped   : 2005-08-18 15:23:46 PDT (00:03:17 ago)
   Statistics last cleared: 2005-08-18 15:25:37 PDT (00:01:26 ago)
   Traffic statistics:
    Input  bytes  :                  840                    0 bps
    Output bytes  :                  912                    0 bps
    Input  packets:                   25                    0 pps
    Output packets:                   26                    0 pps
   Input errors:
     Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
     Policed discards: 0, L3 incompletes: 0,
```

```
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0,
    MTU errors: 0, Resource errors: 0
  Queue counters:       Queued packets  Transmitted packets Dropped packets
    0 best-effort                   0                    0               0
    1 expedited-fo                  0                    0               0
    2 assured-forw                  0                    0               0
    3 network-cont                 26                   26               0
  HDLC configuration:
    Giant threshold: 1514, Runt threshold: 2
    Timeslots      : 1-10
    Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
    Start end flag: shared
  DS0 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 4 (0x00)
Logical interface ds-0/1/0:1.0 (Index 67) (SNMP ifIndex 53) (Generation 11)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 1500, Generation: 26, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 11.11.11.0/30, Local: 11.11.11.2, Broadcast: 11.11.11.3,
        Generation: 39
   DLCI 100
     Flags: Active, Dce-configured
     Total down time: 0 sec, Last down: Never
     Traffic statistics:
      Input  bytes  :                   0
      Output bytes  :                   0
      Input  packets:                   0
      Output packets:                   0
 DLCI statistics:
   Active DLCI  :2 Inactive DLCI  : 0
...
```


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show interfaces (T3 or E3)

Syntax

show interfaces *interface-type*
<brief | detail | extensive | terse>
<descriptions>
<media>
<snmp-index *snmp-index*>
<statistics>

Release Information

Command introduced before Junos OS Release 7.4.

Description

Display status information about the specified T3 or E3 interface.

Options

interface-type—On M Series and T Series routers, the T3 interface type is **t3-*fpc/pic/port***, whereas the E3 interface type is **e3-*fpc/pic/port*** On the J Series routers, the T3 interface type is **t3-*pim*/0/*port***, whereas the E3 interface type is **e3-*pim*/0/*port***.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

descriptions—(Optional) Display interface description strings.

media—(Optional) Display media-specific information about network interfaces.

snmp-index *snmp-index*—(Optional) Display information for the specified SNMP index of the interface.

statistics—(Optional) Display static interface statistics.

Required Privilege Level

view

List of Sample Output

show interfaces (T3, PPP) on page 966
show interfaces detail (T3, PPP) on page 967
show interfaces extensive (T3, PPP) on page 968
show interfaces (E3, Frame Relay) on page 969
show interfaces detail (E3, Frame Relay) on page 970
show interfaces extensive (E3, Frame Relay) on page 971

Output Fields

Table 61 on page 835 lists the output fields for the **show interfaces** (T3 or E3) command. Output fields are listed in the approximate order in which they appear.

Table 68: T3 or E3 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the "Enabled Field" section under *Common Output Fields Description*.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	**detail extensive** none

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Table 68: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source. It can be **Internal** or **External**.	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (**local** or **remote**).	All levels
FCS	Frame check sequence on the interface (either **16** or **32**). The default is **16** bits.	All levels
Mode	(T3 only) Whether C-bit parity mode or M13 mode is enabled.	All levels
Long buildout	(T3 only) Buildout setting: less than 255 feet (68 meters) or greater than 255 feet and shorter than 450 feet (137 meters).	All levels
Framing	(E3 only) Physical layer framing format used on the link. It can be **G751** or **Unframed**. The default is **G751.**	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under *Common Output Fields Description*.	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under *Common Output Fields Description*.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	**detail extensive**
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. • **interval *seconds***—Time in seconds between successive keepalive requests. The range is **10** seconds through **32,767** seconds, with a default of **10** seconds. • **down-count *number***—Number of keepalive packets a destination must fail to receive before the network takes a link down. The range is **1** through **255**, with a default of **3**. • **up-count *number***—Number of keepalive packets a destination must receive to change a link's status from down to up. The range is **1** through **255**, with a default of **1**.	**detail extensive** none

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Table 68: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output

Keepalive statistics or **Keepalive**	(PPP and HDLC) Information about keepalive packets.
	• **Input**—Number of keepalive packets received by PPP.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was received, in the format ***hh:mm:ss***.
	• **Output**—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received.
	  • **(last seen 00:00:00 ago)**—Time since the last keepalive packet was sent, in the format ***hh:mm:ss***.
		detail extensive none

LMI settings	(Frame Relay) Local Management Interface (LMI) settings (ANSI or ITU). ANSI LMI settings is the default. The format is **LMI settings: *value*, *value*... *xx*** seconds, where ***value*** can be: • **n391dte**—DTE full status polling interval (1–255) • **n392dce**—DCE error threshold (1–10) • **n392dte**—DTE error threshold (1–10) • **n393dce**—DCE monitored event count (1–10) • **n393dte**—DTE monitored event count (1–10) • **t391dte**—DTE polling timer (5–30 seconds) • **t392dce**—DCE polling verification timer (5–30 seconds)	**detail extensive** none
LMI	(Frame Relay) LMI statistics: • **Input**—Number of packets coming in on the interface (*nn*) and how much time has passed since the last packet arrived. The format is **Input: *nn* (last seen *hh:mm:ss* ago)**. • **Output**—Number of packets sent out on the interface (*nn*) and how much time has passed since the last packet was sent. The format is **Output: *nn* (last sent *hh:mm:ss* ago)**.	**detail extensive** none
DTE statistics	(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communications equipment (DCE): • **Enquiries sent**—Number of link status enquiries sent from the DTE to the DCE. • **Full enquiries sent**—Number of full enquiries sent from the DTE to the DCE. • **Enquiry responses received**—Number of enquiry responses received by the DTE from the DCE. • **Full enquiry responses received**—Number of full enquiry responses sent from the DTE to the DCE.	**detail extensive** none
DCE statistics	(Frame Relay) Statistics about messages transmitted from the DCE to the DTE: • **Enquiries received**—Number of enquiries received by the DCE from the DTE. • **Full enquiries received**—Number of full enquiries received by the DCE from the DTE. • **Enquiry responses sent**—Number of enquiry responses sent from the DCE to the DTE. • **Full enquiry responses sent**—Number of full enquiry responses sent from the DCE to the DTE.	**detail extensive** none

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Table 68: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: • **Unknown messages received**—Number of received packets that do not fall into any category. • **Asynchronous updates received**—Number of link status peer changes received. • **Out-of-sequence packets received**—Number of packets for which the sequence of the packets received is different from the expected sequence. • **Keepalive responses timedout**—Number of keepalive responses that timed out when no LMI packet was reported for **n392dte** or **n393dce** intervals. (See **LMI settings**.)	**detail extensive** none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE.) Number of DLCIs configured from the DCE.	**detail extensive** none
LCP state	(PPP) Link Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—LCP negotiation is incomplete (not yet completed or has failed). • **Opened**—LCP negotiation is successful.	**detail extensive** none
NCP state	(PPP) Network Control Protocol state. • **Conf-ack-received**—Acknowledgement was received. • **Conf-ack-sent**—Acknowledgement was sent. • **Conf-req-sent**—Request was sent. • **Down**—NCP negotiation is incomplete (not yet completed or has failed). • **Opened**—NCP negotiation is successful.	**detail extensive** none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. • **Chap-Resp-received**—Response received for the challenge sent, but CHAP not yet moved into the Success state. (Most likely with RADIUS authentication.) • **Chap-Resp-sent**—Response sent for the challenge received. • **Chap-Chal-sent**—Challenge sent. • **Chap-Chal-received**—Challenge received but response not yet sent. • **Down**—CHAP authentication is incomplete (not yet completed or has failed). • **Not-configured**—CHAP is not configured on the interface. • **Opened**—CHAP authentication was successful.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:minute:second timezone*** **(*year-month-day hour:minute:second* ago)** . For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.	**detail extensive** none
CoS queues	Number of CoS queues configured.	**detail extensive** none

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Table 68: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface • **Output packets**—Number of packets received on the interface.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—(T3 only) Number of frames received that are smaller than the runt threshold. • **Giants**—(T3 only) Number of frames received that are larger than the giant threshold. • **Bucket Drops**—Drops resulting from the traffic load exceeding the interface transmit/receive leaky bucket configuration. The default is **off**. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • **SRAM errors**—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC or PIM. If the value of this field increments, the PIC or PIM is malfunctioning. • **Resource errors**—Sum of transmit drops.	**extensive**

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Table 68: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
Active alarms **Active defects**	E3 media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. • **AIS**—Alarm indication signal • **EXZ**—Excessive zeros • **FERF**—Far-end receive failures • **IDLE**—Idle code detected • **LCD**—Loss of cell delineation • **LCV**—Line code violation • **LOF**—Loss of frame • **LOS**—Loss of signal • **PLL**—Phase-locked loop • **YLW**—Remote defect indication	**detail extensive** none

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Table 68: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DS3 media or **E3 media**	Counts of DS3 (T3) or E3 media-specific errors. • **Seconds**—Number of seconds the defect has been active. • **Count**—Number of times that the defect has gone from inactive to active. • **State**—State of the error. State other than OK indicates a problem. The DS3 or E3 media-specific error types can be: • **PLL Lock**—Phase-locked loop out of lock • **Reframing**—Frame alignment recovery time • **AIS**—Alarm indication signal • **LOF**—Loss of frame • **LOS**—Loss of signal • **IDLE**—Idle code detected • **YELLOW**—Errors at the remote site receiver • **BPV**—Bipolar violation • **EXZ**—Excessive zeros • **LCV**—Line code violation • **PCV**—(DS3 only) Pulse code violation • **CCV**—(DS3 only) C-bit coding violation • **FEBE**—(DS3 only) Far-end block error • **LES**—Line error seconds • **PES**—(DS3 only) P-bit errored seconds • **PSES**—(DS3 only) P-bit errored seconds (section) • **CES**—(DS3 only) C-bit errored seconds • **CSES**—(DS3 only) C-bit severely errored seconds • **SEFS**—Severely errored framing seconds • **UAS**—Unavailable seconds	**extensive**
HDLC configuration	Information about the HDLC configuration. • **Policing bucket**—Configured state of the receiving policer. • **Shaping bucket**—Configured state of the transmitting shaper. • **Giant threshold**—Giant threshold programmed into the hardware. • **Runt threshold**—Runt threshold programmed into the hardware. • **Idle cycle flag**—Idle cycle flags. • **Start end flag**—Start and end flag.	**extensive**

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Table 68: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DSU configuration	Information about the DSU configuration. The last three lines (**Bit count**, **Error bit count**, and **LOS information**) are displayed only if a BERT has ever been run on the interface. • **Compatibility mod**—CSU/DSU compatibility mode: **None**, **Larscom**, **Kentrox**, or **Digital-Link**. • **Scrambling**—Payload scrambling: **Enabled** or **Disabled**. • **Subrate**—Configured subrate setting. Applies only when **Digital-Link** compatibility mode is used. The subrate can be **Disabled** or display units in Kbps. • **FEAC loopbac**—(T3) Whether a far-end alarm and control (FEAC) loopback is **Active** or **Inactive**. This feature is used to send alarm or status information from the far-end terminal back to the near-end terminal and to initiate T3 loopbacks at the far-end terminal from the near-end terminal. • **Response**—Whether the FEAC signal is **Enabled** or **Disabled**. • **Count**—Number of FEAC loopbacks.	**extensive**
DS3 (or **E3**) **BERT configuration**	BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface. • **BERT time period**—Configured total time period that the BERT is to run. • **Elapsed**—Actual time elapsed since the start of the BERT (in seconds). • **Induced error rate**—Configured rate at which the bit errors are induced in the BERT pattern. • **Algorithm**—Type of algorithm selected for the BERT.	**detail extensive** none
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **PLP byte**—Packet Level Protocol byte.	**extensive**
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		

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Table 68: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Logical interface	Name of the logical interface.	**detail extensive** none
Index	Logical interface index number, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	Logical interface SNMP interface index number.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**extensive**
Flags	Information about the interface. Possible values are described in the "Interface Flags" section under *Common Output Fields Description*.	**detail extensive** none
Encapsulation	Encapsulation on the logical interface.	**detail extensive** none
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**
Local statistics	(Frame Relay) Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	**detail extensive**
Transit statistics	(Frame Relay) Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter normally stabilizes in less than 1 second.	**detail extensive**
Protocol	Protocol family configured on the logical interface, such as **iso**, **inet6**, **mlfr**, or **mpls**.	**detail extensive** none
Multilink bundle	(Multilink) Interface name for the multilink bundle.	**detail extensive** none
MTU	MTU size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route table	Routing table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive**
Flags	Information about the protocol family flags. Possible values are described in the "Family Flags" section under *Common Output Fields Description*.	**detail extensive** none

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Table 68: T3 or E3 show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Addresses, Flags	Information about the address flags. Possible values are described in the "Addresses Flags" section under *Common Output Fields Description*.	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive** none
DLCI	(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: **Flags**, **Total down time**, **Last down**, and **Traffic statistics** (or **Input packets**, **Output packets**). **Flags** is one or more of the following: • **Active**—Set when the link is active and the DTE and DCE are exchanging information. • **Down**—Set when the link is active, but no information is received from the DCE. • **DCE Unconfigured**—Set when the corresponding DLCI in the DCE is not configured. • **Configured**—Set when the corresponding DLCI in the DCE is configured. • **DCE-configured**—Displayed when the command is issued from the DTE.	**detail extensive** none
DLCI statistics	(Frame Relay) Data-link connection identifier (DLCI) statistics. • **Active DLCI**—Number of active DLCIs. • **Inactive DLCI**—Number of inactive DLCIs.	**detail extensive** none

Sample Output

show interfaces (T3, PPP)

```
user@host> show interfaces t3-0/2/0
Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 35
  Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity,
  Long buildout: Shorter than 255 feet
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 0 (never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Closed
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:18:40 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 72 bps (0 pps)
```


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```
  Active alarms  : None
  Active defects : None
  DS3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^15 - 1, O.151, Pseudorandom (9), Induced error rate: 10e-0

Logical interface t3-0/2/0.0 (Index 66) (SNMP ifIndex 54)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255
```

show interfaces detail (T3, PPP)

```
user@host> show interfaces t3-0/2/0 detail
Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 35, Generation: 22
  Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity,
  Long buildout: Shorter than 255 feet
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Closed
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:18:45 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                 152                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   8                   0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                   0                    0

    1 expedited-fo                   0                   0                    0

    2 assured-forw                   0                   0                    0

    3 network-cont                   6                   6                    0

  Active alarms  : None
  Active defects : None
  DS3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^15 - 1, O.151, Pseudorandom (9), Induced error rate: 10e-0

Logical interface t3-0/2/0.0 (Index 66) (SNMP ifIndex 54) (Generation 8)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470, Generation: 17, Route table: 0
      Flags: Protocol-Down
```

```
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 24
```

show interfaces extensive (T3, PPP)

```
user@host> show interfaces t3-0/2/0 extensive
Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 35, Generation: 22
  Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity,
  Long buildout: Shorter than 255 feet
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Down
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Closed
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:43:06 PST (02:18:47 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                 171                  72 bps
   Input  packets:                   0                   0 pps
   Output packets:                   9                   0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Bucket drops: 0, Policed discards: 0, L3 incompletes: 0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0,
    SRAM errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

    Resource errors: 0
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   0                   0                   0

    1 expedited-fo                  0                   0                   0

    2 assured-forw                  0                   0                   0

    3 network-cont                  7                   7                   0

  Active alarms  : None
  Active defects : None
  DS3 media:            Seconds        Count  State
    PLL Lock                  0            0  OK
    Reframing                 0            0  OK
    AIS                       0            0  OK
    LOF                       0            0  OK
    LOS                       0            0  OK
    IDLE                      0            0  OK
    YELLOW                    0            0  OK
```


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```
    BPV                         0           0
    EXZ                         0           0
    LCV                         1           4
    PCV                         0           0
    CCV                         0           0
    FEBE                        1          11
    LES                         1
    PES                         0
    PSES                        0
    CES                         0
    CSES                        0
    SEFS                        0
    UAS                         0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 4484, Runt threshold: 3
    Idle cycle flag: flags, Start end flag: shared
  DSU configuration:
    Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
    FEAC loopback: Inactive, Response: Disabled, Count: 0
  DS3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^15 - 1, O.151, Pseudorandom (9), Induced error rate: 10e-0
  Packet Forwarding Engine configuration:
    Destination slot: 0, PLP byte: 1 (0x00)
  CoS information:
    CoS transmit queue       Bandwidth          Buffer   Priority    Limit
                          %          bps     %     usec
    0 best-effort        95     42499200    95        0         low    none
    3 network-control     5      2236800     5        0         low    none

Logical interface t3-0/2/0.0 (Index 66) (SNMP ifIndex 54) (Generation 8)
    Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470, Generation: 17, Route table: 0
      Flags: Protocol-Down
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 24
```

show interfaces (E3, Frame Relay)

```
user@host> show interfaces e3-1/2/0
Physical interface: e3-1/2/0, Enabled, Physical link is Up
  Interface index: 153, SNMP ifIndex: 49
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, Speed: E3,
  Loopback: None, FCS: 16, Framing: G751
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI: Input: 0 (never), Output: 4 (00:00:06 ago)
  DTE statistics:
    Enquiries sent                     : 4
    Full enquiries sent                : 0
    Enquiry responses received         : 0
    Full enquiry responses received    : 0
  DCE statistics:
    Enquiries received                 : 0
    Full enquiries received            : 0
    Enquiry responses sent             : 0
```

```
    Full enquiry responses sent          : 0
  Common statistics:
    Unknown messages received            : 0
    Asynchronous updates received        : 0
    Out-of-sequence packets received     : 0
    Keepalive responses timedout         : 1
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:46:14 PST (02:27:17 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None

  Logical interface e3-1/2/0.0 (Index 66) (SNMP ifIndex 57)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Input packets : 0
  Output packets: 0
    Protocol inet, MTU: 4470
      Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255
    DLCI 100
      Flags: Down, DCE-Unconfigured
      Total down time: 00:00:06 sec, Last down: 00:00:06 ago
      Input packets : 0
      Output packets: 0
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces detail (E3, Frame Relay)

```
user@host> show interfaces e3-1/2/0 detail
Physical interface: e3-1/2/0, Enabled, Physical link is Up
  Interface index: 153, SNMP ifIndex: 49, Generation: 36
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, Speed: E3,
  Loopback: None, FCS: 16, Framing: G751
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE
  Hold-times     : Up 0 ms, Down 0 ms
  ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
  LMI statistics:
    Input : 0 (last seen: never)
    Output: 5 (last sent 00:00:07 ago)
  DTE statistics:
    Enquiries sent                       : 5
    Full enquiries sent                  : 0
    Enquiry responses received           : 0
    Full enquiry responses received      : 0
  DCE statistics:
    Enquiries received                   : 0
    Full enquiries received              : 0
    Enquiry responses sent               : 0
    Full enquiry responses sent          : 0
  Common statistics:
    Unknown messages received            : 0
    Asynchronous updates received        : 0
    Out-of-sequence packets received     : 0
    Keepalive responses timedout         : 1
  CoS queues     : 4 supported, 4 in use
  Last flapped   : 2005-12-05 08:46:14 PST (02:27:27 ago)
```


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```
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                  806                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                   44                    0 pps
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                  43                   43                    0

  Active alarms  : None
  Active defects : None

  Logical interface e3-1/2/0.0 (Index 66) (SNMP ifIndex 57) (Generation 15)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
    Traffic statistics:
     Input  bytes  :                    0
     Output bytes  :                    0
     Input  packets:                    0
     Output packets:                    0
    Local statistics:
     Input  bytes  :                    0
     Output bytes  :                    0
     Input  packets:                    0
     Output packets:                    0
    Transit statistics:
     Input  bytes  :                    0                    0 bps
     Output bytes  :                    0                    0 bps
     Input  packets:                    0                    0 pps
     Output packets:                    0                    0 pps
    Protocol inet, MTU: 4470, Generation: 24, Route table: 0
      Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
        Generation: 38
    DLCI 100
      Flags: Down, DCE-Unconfigured
      Total down time: 00:00:16 sec, Last down: 00:00:16 ago
      Traffic statistics:
       Input  bytes  :                    0
       Output bytes  :                    0
       Input  packets:                    0
       Output packets:                    0
  DLCI statistics:
    Active DLCI  :0  Inactive DLCI  :1
```

show interfaces extensive (E3, Frame Relay)

```
user@host> show interfaces e3-1/2/0 extensive
Physical interface: e3-1/2/0, Enabled, Physical link is Up
  Interface index: 153, SNMP ifIndex: 49, Generation: 36
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, Speed: E3,
  Loopback: None, FCS: 16, Framing: G751
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
```

```
Link flags     : Keepalives DTE
Hold-times     : Up 0 ms, Down 0 ms
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI statistics:
  Input : 0 (last seen: never)
  Output: 6 (last sent 00:00:02 ago)
DTE statistics:
  Enquiries sent                       : 5
  Full enquiries sent                  : 1
  Enquiry responses received           : 0
  Full enquiry responses received      : 0
DCE statistics:
  Enquiries received                   : 0
  Full enquiries received              : 0
  Enquiry responses sent               : 0
  Full enquiry responses sent          : 0
Common statistics:
  Unknown messages received            : 0
  Asynchronous updates received        : 0
  Out-of-sequence packets received     : 0
  Keepalive responses timedout         : 1
CoS queues     : 4 supported, 4 in use
Last flapped   : 2005-12-05 08:46:14 PST (02:27:30 ago)
Statistics last cleared: Never
Traffic statistics:
 Input  bytes  :                    0                    0 bps
 Output bytes  :                  821                   56 bps
 Input  packets:                    0                    0 pps
 Output packets:                   45                    0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 21118, Bucket drops: 0,
  Policed discards: 0, L3 incompletes: 0, L2 channel errors: 0,
  L2 mismatch timeouts: 0, HS link CRC errors: 0, SRAM errors: 0,
  Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,

  Resource errors: 0
Queue counters:       Queued packets  Transmitted packets      Dropped packets

  0 best-effort                    0                    0                    0

  1 expedited-fo                   0                    0                    0

  2 assured-forw                   0                    0                    0

  3 network-cont                  44                   44                    0

Active alarms  : None
Active defects : None
E3  media:            Seconds        Count  State
  PLL Lock                  0            0  OK
  Reframing               187            1  OK
  AIS                       0            0  OK
  LOF                     187            1  OK
  LOS                     187            1  OK
  IDLE                      0            0  OK
  YELLOW                    0            0  OK
  BPV                       0            0
  EXZ                       0            0
  LCV                     188     12303167
```


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```
  LES                     188
  SEFS                    187
  UAS                     195
DSU configuration:
  Compatibility mode: None, Scrambling: Disabled
E3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, O.151, Pseudorandom (9), Induced Error rate: 10e-0
Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue       Bandwidth          Buffer   Priority    Limit
                        %          bps     %     usec
  0 best-effort        95     32649600    95        0         low     none
  3 network-control     5      1718400     5        0         low     none

Logical interface e3-1/2/0.0 (Index 66) (SNMP ifIndex 57) (Generation 15)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
  Traffic statistics:
   Input  bytes  :                   0
   Output bytes  :                   0
   Input  packets:                   0
   Output packets:                   0
  Local statistics:
   Input  bytes  :                   0
   Output bytes  :                   0
   Input  packets:                   0
   Output packets:                   0
  Transit statistics:
   Input  bytes  :                   0                    0 bps
   Output bytes  :                   0                    0 bps
   Input  packets:                   0                    0 pps
   Output packets:                   0                    0 pps
  Protocol inet, MTU: 4470, Generation: 24, Route table: 0
    Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
      Generation: 38
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:00:19 sec, Last down: 00:00:19 ago
    Traffic statistics:
     Input  bytes  :                  0
     Output bytes  :                  0
     Input  packets:                  0
     Output packets:                  0
DLCI statistics:
  Active DLCI  :0  Inactive DLCI  :1
```

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show interfaces controller (Channelized E1 IQ)

Syntax show interfaces controller ce1-*fpc/pic/port*

Release Information Command introduced before Junos OS Release 7.4.

Description Display the interface names of the physical channelized E1 IQ interface and the channels configured on each interface.

Options **ce1-*fpc/pic/port***—Basic Rate Interface (BRI) interface name.

Required Privilege Level view

List of Sample Output
show interfaces controller (Channelized E1 IQ with Logical E1) on page 974
show interfaces controller (Channelized E1 IQ with Logical DS0) on page 974

Output Fields Table 69 on page 974 lists the output fields for the **show interfaces controller** (Channelized E1 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 69: Channelized E1 IQ show interfaces controller Output Fields

Field Name	Field Description
Controller	Physical channelized interface name and the names of any channels configured on it.
Admin	Administrative status of the interface.
Link	Link status of the interface.

Sample Output

show interfaces controller (Channelized E1 IQ with Logical E1)

```
user@host> show interfaces controller ce1-1/2/6

Controller                                                  Admin Link
ce1-1/2/6                                                   up    up
e1-1/2/6                                                    up    up
```

show interfaces controller (Channelized E1 IQ with Logical DS0)

```
user@host> show interfaces controller ce1-1/2/3

Controller                                                  Admin Link
ce1-1/2/3                                                   up    up

ds-1/2/3:1                                                  up    up

ds-1/2/3:2                                                  up    up
```


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show interfaces controller (Channelized OC12 IQ and IQE)

Syntax show interfaces controller coc12-*fpc/pic/port*

Release Information Command introduced before Junos OS Release 7.4.

Description Display a list of channels configured on a channelized OC12 IQ or IQE interface.

Options **coc12-*fpc/pic/slot***—Channelized OC12 IQ or IQE interface name.

Required Privilege Level view

List of Sample Output show interfaces controller (Channelized OC12 IQ) on page 975

Output Fields Table 70 on page 975 lists the output fields for the **show interfaces controller** (Channelized OC12 IQ and IQE) command. Output fields are listed in the approximate order in which they appear.

Table 70: Channelized OC12 IQ and IQE show interfaces controller Output Fields

Field Name	Field Description
Controller	Physical channelized interface name and the names of any channels configured on it.
Admin	Administrative status of the interface.
Link	Link status of the interface.

Sample Output

show interfaces controller (Channelized OC12 IQ)

```
user@host> show interfaces controller
Controller                                                      Admin Link
coc12-4/2/0                                                     up    up
    so-4/2/0:1                                                  up    up
    t3-4/2/0:2                                                  up    up
    ct3-4/2/0:3                                                 up    up
        t1-4/2/0:3:1                                            up    up
        t1-4/2/0:3:2                                            up    up
      ...
        t1-4/2/0:3:28                                           up    up
    ct3-4/2/0:4                                                 up    up
        ct1-4/2/0:4:1                                           up    up
            ds-4/2/0:4:1:1                                      up    up
            ds-4/2/0:4:1:2                                      up    up
          ...
            ds-4/2/0:4:1:24                                     up    up
        ct1-4/2/0:4:2                                           up    up
            ds-4/2/0:4:2:1                                      up    up
            ds-4/2/0:4:2:2                                      up    up
```

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```
      ...
        ds-4/2/0:4:2:6                                          up    up
    t1-4/2/0:4:3                                                up    up
    t1-4/2/0:4:4                                                up    up
  ...
    t1-4/2/0:4:28                                               up    up
t3-4/2/0:5                                                      up    up
coc1-4/2/0:6                                                    up    up
    t1-4/2/0:6:1                                                up    up
    t1-4/2/0:6:2                                                up    up
  ...
    t1-4/2/0:6:28                                               up    up
coc1-4/2/0:7                                                    up    up
    ct1-4/2/0:7:1                                               up    up
        ds-4/2/0:7:1:1                                          up    up
        ds-4/2/0:7:1:2                                          up    up
      ...
        ds-4/2/0:7:1:24                                         up    up
    ct1-4/2/0:7:2                                               up    up
        ds-4/2/0:7:2:1                                          up    up
        ds-4/2/0:7:2:2                                          up    up
      ...
        ds-4/2/0:7:2:6                                          up    up
    t1-4/2/0:7:3                                                up    up
    t1-4/2/0:7:4                                                up    up
  ...
    t1-4/2/0:7:28                                               up    up
so-4/2/0:8                                                      up    up
```


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show interfaces controller (Channelized OC3 IQ and IQE)

Syntax show interfaces controller coc3-*fpc/pic/slot*

Release Information Command introduced before Junos OS Release 7.4.

Description Display a list of channels configured on a channelized OC3 IQ and IQE interface.

Options **coc3-*fpc/pic/slot***—channelized OC3 IQ or IQE interface name.

Required Privilege Level view

List of Sample Output show interfaces controller (Channelized OC3 IQ) on page 977

Output Fields Table 52 on page 684 lists the output fields for the **show interfaces controller** (Channelized OC3 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 71: Channelized OC3 IQ and IQE show interfaces controller Output Fields

Field Name	Field Description
Controller	Physical channelized interface name and the names of any channels configured on it.
Admin	Administrative status of the interface.
Link	Link status of the interface.

Sample Output

show interfaces controller (Channelized OC3 IQ)

```
user@host> show interfaces controller coc3-4/2/0
Controller                                                      Admin Link
coc3-4/2/0                                                      up    up
    coc1-4/2/0:1                                                up    up
        ct1-4/2/0:1:1                                           up    up
            ds-4/2/0:1:1:1                                      up    up
ct3-0/2/0                                                       up    up
ct3-0/2/1                                                       up    up
ct3-0/2/2                                                       up    up
ct3-0/2/3                                                       up    up
```

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show interfaces controller (Channelized STM1 IQ)

Syntax show interfaces controller cstm1-*fpc/pic/port*

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display the interface names of the physical channelized STM1 IQ interface and the channels configured on each interface.

Options **cstm1-*fpc/pic/slot***—Channelized STM1 IQ interface name.

Required Privilege Level view

List of Sample Output show interfaces controller (Physical Channelized STM1 IQ with Logical E1) on page 978

Output Fields Table 72 on page 978 lists the output fields for the **show interfaces controller** (Channelized STM1 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 72: Channelized STM1 IQ show interfaces controller Output Fields

Field Name	Field Description
Controller	Physical channelized interface name and the names of any channels configured on it.
Admin	Administrative status of the interface.
Link	Link status of the interface.

Sample Output

show interfaces controller (Physical Channelized STM1 IQ with Logical E1)

```
user@host> show interfaces controller cstm1-0/0/0
Controller                                                      Admin Link
cstm1-0/0/0                                                     up    up
cau4-0/0/0                                                      up    up
    e1-0/0/0:1                                                  up    up
    e1-0/0/0:2                                                  up    up
    e1-0/0/0:3                                                  up    up
    e1-0/0/0:4                                                  up    up
    e1-0/0/0:5                                                  up    up
    e1-0/0/0:6                                                  up    up
    e1-0/0/0:7                                                  up    up
    e1-0/0/0:8                                                  up    up
    e1-0/0/0:9                                                  up    up
    e1-0/0/0:10                                                 up    up
    ce1-0/0/0:11                                                up    up
        ds-0/0/0:11:1                                           up    up
        ds-0/0/0:11:2                                           up    up
        ds-0/0/0:11:3                                           up    up
        ds-0/0/0:11:4                                           up    up
```


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show interfaces controller (Channelized T1 IQ)

Syntax show interfaces controller ct1-*fpc/pic/slot*

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display the interface names of the specified physical channelized T1 IQ interface and the channels configured on it.

Options **ct1-*fpc/pic/slot***—Channelized T1 IQ interface name.

Required Privilege Level view

List of Sample Output
show interfaces controller (T1 IQ) (Clear-Channel T1) on page 980
show interfaces controller (T1 IQ) (Channelized DS) on page 980

Output Fields Table 73 on page 980 lists the output fields for the **show interfaces controller** (Channelized T1 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 73: Channelized T1 IQ show interfaces controller Output Fields

Field Name	Field Description
Controller	Physical channelized interface name and the names of any channels configured on it.
Admin	Administrative status of the interface.
Link	Link status of the interface.

Sample Output

show interfaces controller (T1 IQ) (Clear-Channel T1)

The following sample output displays the channelized T1 IQ interface when it is configured as a clear-channel T1 interface:

```
user@host> show interfaces controller ct1-0/2/0

Controller                                                    Admin Link
ct1-0/2/0                                                     up    up
t1-0/2/0                                                      up    up
```

show interfaces controller (T1 IQ) (Channelized DS)

The following sample output displays the channelized T1 IQ interfaces when it is configured down to the channelized DS level:

```
user@host> show interfaces controller ct1-0/2/1
Controller                                                    Admin Link
ct1-0/2/1                                                     up    up
    ds-0/2/1:1                                                up    up
    ds-0/2/1:2                                                up    up
```


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show interfaces controller (Channelized T3 IQ)

Syntax show interfaces controller ct3-*fpc/pic/slot*

Release Information Command introduced before Junos OS Release 7.4.

Description (M Series and T Series routers only) Display the interface names of the specified physical channelized T3 IQ interface and the channels configured on it.

Options **ct3-*fpc/pic /slot***—Channelized T3 IQ interface name.

Required Privilege Level view

List of Sample Output show interfaces controller (T3 IQ) on page 982

Output Fields Table 74 on page 982 lists the output fields for the **show interfaces controller** (Channelized T3 IQ) command. Output fields are listed in the approximate order in which they appear.

Table 74: Channelized T3 IQ show interfaces controller Output Fields

Field Name	Field Description
Controller	Physical channelized interface name and the names of any channels configured on it.
Admin	Administrative status of the interface.
Link	Link status of the interface.

Sample Output

show interfaces controller (T3 IQ)

```
user@host> show interfaces controller ct3-0/0/1
Controller                                                    Admin Link
ct3-0/0/1                                                     up    up
    t1-0/0/1:1                                                up    up
    ct1-0/0/1:2                                               up    up
        ds-0/0/1:2:1                                          up    up
        ds-0/0/1:2:2                                          up    up
        ds-0/0/1:2:3                                          up    up
    t1-0/0/1:3
  ...                                                       up    down
    t1-0/0/1:10                                               up    up
    ct1-0/0/1:11                                              up    up
  ...
    ct1-0/0/1:28                                              up    up
```


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PART 5

Index

- Index on page 985

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Index

Symbols

#, comments in configuration statements....xxiv
( ), in syntax descriptions....xxiv
< >, in syntax descriptions....xxiv
[ ], in configuration statements....xxiv
{ }, in configuration statements....xxiv
| (pipe), in syntax descriptions....xxiv

A

address statement....367
advertise-interval statement....369
aggregated SONET/SDH interfaces
    status information, displaying....685
alarms
    Channelized DS3 interfaces, checklist....263
    Channelized OC12 interfaces, checklist....332
    Channelized OC12 IQ interfaces, checklist....332
    Multichannel DS3 interfaces, checklist....292
aps statement....370
authentication-key statement....371

B

bchannel-allocation statement....371
BERT
    configuring interface diagnostics....229
bert-algorithm statement....372
    usage guidelines....229
bert-error-rate statement....374
    usage guidelines....229
bert-period statement....376
    usage guidelines....229
bit error rate test *See* BERT
braces, in configuration statements....xxiv
brackets
    angle, in syntax descriptions....xxiv
    square, in configuration statements....xxiv
byte encoding....377
byte-encoding statement....377
bytes statement....378

C

C-bit parity mode....379
cbit-parity statement....379
channel scaling numbers
    channelized sonet/sdh oc3/stm1 (multi-rate) mics with sfp....12
    ds3/e3 mic....13
channel, Channelized OC12 IQ interfaces....311
channelization
    configuring....207
channelization levels, controller interface....311
channelization statement....379
channelized AU-4 interfaces....148, 155, 176
    example configuration....149, 155, 176
Channelized DS3 interfaces
    alarms and errors....263
    circuit problem....261
    clear interfaces statistics command....256
    edit interfaces command....256, 258
    edit interfaces t1-options command....254, 262
    edit interfaces t3-options command....254
    encapsulation, configuring....256
    errors....249
    link layer, forcing up....256
    local loopback, configuring....254
    logical interface....258
    loopback, configuring
        from specific T1 interface....262
    monitor interface command....249
    monitor, checklist....239
    no keepalives, configuring....258
    notification messages....266
    physical link status....241, 255
    physical loopback, creating....254
    ping interface command....259
    set encapsulation command....257
    set loopback local command....254
    set loopback remote command....262
    set no-keepalives command....258
    show interfaces command....241, 255, 258
    show interfaces extensive command....244, 260, 263
    show interfaces terse command....240
    statistics
        checking error....259
        monitoring....249
        resetting....256

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status
displaying 240, 255
displaying specific 241, 244
extensive 244
logical interface, verifying....258
t1-options statement....254, 262
t3-options statement....254
channelized DS3 IQ interfaces
example configuration....90
operational mode commands....92
channelized DS3 to DS0 interfaces
alarms and errors 295
clear interfaces statistics command....282
logical interface 284
monitor interfaces command 275
ping interface command....285
show interfaces command....281, 284
show interfaces extensive command....286, 295
channelized DS3 to DS1 interfaces
alarms and errors 292
show interfaces command....255, 281, 284
show interfaces extensive command....293
channelized DS3-to-DS0 interfaces
status information, displaying....477, 692, 904
channelized DS3-to-DS1 interfaces
status information, displaying....488, 703, 915
channelized E1 interfaces
example configuration....29, 32, 151, 178, 183
interface naming....29, 183
status information, displaying....495, 565, 605, 710
channelized E1 IQ and IQE interfaces
time slots....195
channelized E1 IQ interfaces
controller information, displaying....974
example configuration....34, 107
operational mode commands....108
status information, displaying....491, 576, 616, 706
time slots....33
channelized E1 IQE interfaces
example configuration....34
time slots....33
channelized E3 (COC48/STM16) interfaces
example configuration....177
channelized interfaces....269
Channelized DS3, status, displaying....240
clock sources....8
errors....249, 275, 304
Multichannel DS3, status, displaying....270
notification messages....294
OC12 IQ status, displaying....305
OC12 status, displaying....300
physical link down 301
statistics monitoring 275
status....255, 281, 322
extensive....244, 272, 314
channelized IQ interfaces
configuration procedure....45
example configuration
clear channel OC12....52
complex OC12....56
convert OC12 to STM4....77
CoS....111
DS3....90
E1....107
OC3....83
STM1....100
T1....96
operational mode commands....53, 63, 81, 86, 92, 97, 103, 108, 112
overview....38
supported options....14
system requirements....44
channelized NxDS0 IQ interfaces
example configuration....34, 179, 203
channelized NxDS0 IQE interfaces
example configuration....34
channelized OC12 (COC48/STM16 IQE) interfaces....167
example configuration....168
channelized OC12 interfaces
example configuration....134, 135, 162
status information, displaying....510, 657, 725
Channelized OC12 interfaces
alarms 335
alarms and errors 333
checklist for alarms....332
circuit problem 331
clear interfaces statistics command....324
defects....335
edit interfaces command 325, 326
edit interfaces t3-options command 331
encapsulation, configuring 325
errors....304, 335
link layer, forcing up 325
local loopback, configuring 321

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logical interface 326
loopback, configuring
for entire T3 interface 331
monitor
checklist....299
statistics....304
monitor interface command....316
no keepalives, configuring 326
physical link status....301, 322
physical loopback, creating 320
ping interface command 327
set cli terminal command....305
set encapsulation command 325
set loopback local command 321
set loopback remote command 331
set no-keepalives command 326
show command 321
show interfaces coc1 command....310
show interfaces coc12 command....310
show interfaces command....301, 322
show interfaces ct1 command....310
show interfaces ct3 command....310
show interfaces extensive
command....302, 328, 333
show interfaces terse command....300
statistics
checking error 328
monitoring 304
resetting 324
status
displaying 322
displaying for specific....301
extensive....302
logical interface, verifying 326
t3-options statement 321, 331
channelized OC12 IQ interfaces
controller information, displaying....975
example configuration....52, 56, 77, 158
operational mode commands....53, 63, 81
SDH mode....77
status information, displaying....506, 661, 721
Channelized OC12 IQ interfaces
alarms and errors 336
checklist for alarms 332
circuit problem 331
configuration....308
figure 307
controller interface....307
channelization levels....311
status, displaying....309, 311
edit interfaces command....325, 326
edit interfaces t3-options command....331
encapsulation, configuring 325
errors....316
hierarchy....307
individual channels down....307
link layer, forcing up....325
local loopback, configuring 321
logical interface 326
loopback, configuring
for entire T3 interface....331
monitor checklist 299
no keepalives, configuring....326
physical link status....307, 322
physical loopback, creating 320
ping interface command 327
set encapsulation command....325
set loopback local command....321
set loopback remote command....331
set no-keepalives command....326
show command 321
show interfaces command 309, 311, 322
show interfaces controller command....306
show interfaces extensive 328
show interfaces extensive command....336
show interfaces terse coc command....305
show interfaces terse command....306
specific
channel, displaying status....311
figure....313
statistics
checking error....328
monitoring 316
resetting....324
status
displaying....322
displaying for specific....311
extensive....314
logical interface, verifying....326
t3-options statement....331
channelized OC12 IQE interfaces
controller information, displaying....975
status information, displaying....506, 661, 721
channelized OC3 (COC48/STM16 IQE)
interfaces....168
example configuration....169

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channelized OC3 interfaces....140
example configuration....140
channelized OC3 IQ interfaces
controller information, displaying....684, 977
example configuration....83
operational mode commands....86
status information, displaying....514, 665, 729
channelized OC3 IQE interfaces
controller information, displaying....684, 977
status information, displaying....514, 665, 729
channelized OC48 IQ interfaces
status information, displaying....748
channelized OC48 IQE interfaces
example configuration....180
status information, displaying....748
channelized STM1 interfaces
example configuration....192
status information, displaying....536, 753, 852
time slots....34, 196
channelized STM1 IQ interfaces
controller information, displaying....978
example configuration....100, 197
operational mode commands....103
status information, displaying....533, 750
channelized T1 (COC48/STM16 IQE) interfaces
VT mapping....171
channelized T1 interfaces
example configuration....119, 157
VT mapping....142, 151
channelized T1 IQ and IQE interfaces
example configuration....157
channelized T1 IQ interfaces
controller information, displaying....980
example configuration....96
operational mode commands....97
status information,
displaying....551, 620, 768, 867, 945
VT mapping....128, 158
channelized T1 IQE interfaces
VT mapping....178
channelized T1 or CT1 (COC48/STM16, SDH mode)
IQE interfaces
example configuration....179
channelized T3 (COC48/STM16 IQE) interfaces
example configuration....170
channelized T3 interfaces
example configuration....140
channelized T3 IQ and IQE interfaces
example configuration....156
channelized T3 IQ interfaces
controller information, displaying....982
example configuration....126
status information, displaying....563, 780, 918
channelized T3 IQE interfaces
example configuration....126
checklist for alarms
Channelized DS3 alarms....263
Channelized OC12 interfaces....332
Channelized OC12 IQ interfaces....332
Multichannel DS3 alarms....292
checklist for monitoring
Channelized DS3 interfaces....239
Channelized OC12 interfaces....299
Channelized OC12 IQ interfaces....299
Multichannel DS3 interfaces....269
circuit problems
Channelized DS3 interfaces....261
Channelized OC12 interfaces....331
Channelized OC12 IQ interfaces....331
class of service
operational mode commands....112
clear interfaces statistics command
Channelized DS3 interfaces....256
channelized DS3 to DS0 interfaces....282
Channelized OC12 interfaces....324
clock sources....380
channelized interfaces....8
clocking statement....380
commands for router management,
interfaces....234, 236
comments, in configuration statements....xxiv
configuration, interfaces
Channelized OC12 IQ....308
controller interface
Channelized OC12 IQ interfaces....307, 309
levels of channelization, figure....311
show interfaces command....309
conventions
text and syntax....xxiii
CoS
channelized IQ interfaces
example configuration....111
forwarding table, displaying
configuration....473
interfaces, displaying....445
curly braces, in configuration statements....xxiv
customer support....xxv
contacting JTAC....xxv

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D

data-input statement....381
dlci statement....382
documentation
comments on....xxv
DS interfaces
status information, displaying....580, 632, 810, 879, 920
DS0 interface....313
ds0-options statement....440
usage guidelines....29, 183

E

E1 interfaces
example configuration....29, 183
status information, displaying....580, 632, 810, 879, 920
E1 IQ interfaces
example configuration....195
E1 IQE interfaces
example configuration....195
e1-options statement....383
usage guidelines....29, 183
E3 interfaces
status information, displaying....835, 957
edit interfaces command....236
Channelized DS3 interfaces....256, 258
Channelized OC12 interfaces....325, 326
Channelized OC12 IQ interfaces....325, 326
Multichannel DS3 interfaces....283, 284
edit interfaces t1-options command
Channelized DS3 interfaces....254, 262
Multichannel DS3 interfaces....280, 291
edit interfaces t3-options command
Channelized DS3 interfaces....254
Channelized OC12 interfaces....321, 331
Channelized OC12 IQ interfaces....321, 331
Multichannel DS3 interfaces....280, 290
encapsulation statement
logical interfaces....384
physical interface....388
encoding
byte....377
errors
Channelized DS3 interfaces....249
channelized interfaces....275
Channelized OC12 interfaces....304
Channelized OC12 IQ interfaces....316
external clock sources....380

F

family statement....393
fast-aps-switch statement....397
fcs statement....398
feac-loop-respond statement....399
font conventions....xxiii
force statement....400
forwarding table
CoS information, displaying
configuration....473
fractional E1 IQ and IQE interfaces
time slots....195
fractional E1 IQ interfaces
example configuration....34, 196
time slots....33
fractional E1 IQE interfaces
example configuration....34
fractional T1 (COC48/STM16 IQE) interfaces
example configuration....172
time slots....172
fractional T1 interfaces
example configuration....145
time slots....144
fractional T1 IQ interfaces
example configuration....130, 202, 211
framing statement
channelized OC12 IQ interfaces
usage guidelines....153
channelized OC12 IQE interfaces
usage guidelines....147
channelized OC48 IQE interfaces
usage guidelines....175
E1, E3, and T1 interfaces....401

H

hierarchy
Channelized OC12 IQ interfaces....307
hold-time statement
APS....402

I

idle-cycle-flag statement....403
interface-type statement....404
channelized (COC48/STM16 IQE) interfaces
usage guidelines....167, 168
channelized E1 (COC48/STM16) IQE interfaces
usage guidelines....177
channelized E1 IQE interfaces
usage guidelines....150

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channelized E3 (COC48/STM16) IQE interfaces
usage guidelines....176
channelized E3 interfaces
usage guidelines....149
channelized OC3 interfaces
usage guidelines....148
channelized OC3 IQ interfaces
usage guidelines....140, 155
channelized OC48 IQE interfaces
usage guidelines....176
channelized T1 (COC48/STM16 IQE) interfaces
usage guidelines....170
channelized T1 (COC48/STM16, SDH mode) IQE interfaces
usage guidelines....179
channelized T1 interfaces
usage guidelines....141
channelized T1 IQ interfaces
usage guidelines....157, 194
channelized T1 IQE interfaces
usage guidelines....156
channelized T3 (COC48/STM16, SDH mode) IQE interfaces
usage guidelines....178
channelized T3 IQ and IQE interfaces
usage guidelines....155
E1 (COC48/STM16) IQE interfaces
usage guidelines....177
NxDS0 (COC48/STM16 IQE) interfaces
usage guidelines....172
NxDS0 interfaces
usage guidelines....142
T1 (COC48/STM16, SDH mode) IQE interfaces
usage guidelines....179
T3 (COC48/STM16, SDH mode) IQE interfaces
usage guidelines....178
T3 IQ and IQE interfaces
usage guidelines....155
interfaces
alarms....237
clock sources....380
configuration statements....346
investigation process....237
locating alarms....237
loopback test commands, table....236
monitoring commands, table....234
monitoring, general steps....234
troubleshooting overview, (monitoring, loopback testing, and locating alarms)....234
internal clock sources....380
inverse-arp statement....405
invert-data statement....406
investigation process
interfaces....237
isdn-options statement....407

L

line-encoding statement....438
link PIC failover
channelized OC12 IQ interfaces....163
channelized OC48 IQE interfaces....182
channelized STM1 IQ and IQE PICs....199
lmi-type statement....408
lockout statement....408
logical systems
configuration statements....362
long-buildout statement....441
loopback statement
ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3....409
loopback testing....227
loopback, configuring local
Channelized DS3 interfaces....254
Channelized OC12 interfaces....321
Channelized OC12 IQ interfaces....321
Multichannel DS3 interfaces....280
loopback, creating physical
Channelized DS3 interfaces....254
Channelized OC12 interfaces....320
Channelized OC12 IQ interfaces....320
Multichannel DS3 interfaces....280

M

manuals
comments on....xxv
monitor interface command
Channelized DS3 interfaces....249
channelized DS3 to DS0 interfaces....275
Channelized OC12 interfaces....304
Channelized OC12 IQ interfaces....316
mtu statement....411
multicast-dlci statement....413
Multichannel DS3 interfaces
alarms and errors....292, 295
checklist for alarms....292
clear interface statistics command....282
edit interfaces command....283, 284
edit interfaces t1-options command....280, 291

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edit interfaces t3-options command....280, 290
encapsulation, configuring....283
errors....275
link layer, forcing up....283
local loopback, configuring....280
loopback, configuring
for entire T3 interface....290
from specific T1 interface....291
monitor
channelized....275
checklist....269
monitor interfaces command....275
no keepalives, configuring....284
physical link status....270, 277, 281
physical loopback, creating....280
ping interface command....285
problems, table....277
set cli terminal command....277
set encapsulation command....283
set loopback local command....280
set loopback remote command....290, 291
set no-keepalives command....284
show command....280
show interfaces command....281
show interfaces extensive command....286, 295
statistics
checking error....286
monitoring....275
resetting....282
status
displaying....270, 281
displaying specific....271
extensive....272
logical interface, verifying....284
t1-options statement....280, 291
t3-options statement....280, 290
multipoint-destination statement....414

N

neighbor statement....415
network....261, 290, 331
no-cbit-parity statement....379
no-feac-loop-respond statement....399
no-keepalives statement....416
no-long-buildout statement....441
no-partition statement....417
channelized E1 IQ interfaces
usage guidelines....33
channelized E1 IQE interfaces
usage guidelines....33
channelized OC12 IQ interfaces
usage guidelines....147, 153
channelized OC12/STM4 interfaces
usage guidelines....138
channelized OC3 IQ interfaces
usage guidelines....116, 125
channelized T3 (COC48/STM16 IQE) interfaces
usage guidelines....169
channelized T3 interfaces
usage guidelines....138
channelized T3 IQ interfaces
usage guidelines....194
no-termination-request statement....418
no-translate-discard-eligible statement....430
notification messages, logging for....266, 294
NxDS0 (COC48/STM16) IQE interfaces
usage guidelines....178
NxDS0 interfaces
usage guidelines....151
NxDS0 IQ interfaces
example configuration....197, 212
usage guidelines....158

O

oc-slice statement....419
usage guidelines....138, 148, 154, 169
OC1 interface....313
OC12 interfaces
example configuration....134
OC3 SONET interface....313

P

paired-group statement....419
parentheses, in syntax descriptions....xxiv
partition statement....420
channelized AU-4 (on OC48 IQE) interfaces
usage guidelines....176
channelized AU-4 interfaces
usage guidelines....148, 155
channelized E1 (COC48/STM16) IQE interfaces
usage guidelines....177
channelized E1 IQE interfaces
usage guidelines....150

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channelized E3 (COC48/STM16) IQE interfaces
usage guidelines....176
channelized E3 interfaces
usage guidelines....149
channelized OC12 (COC48/STM16 IQE) interfaces
usage guidelines....167
channelized OC3 (COC48/STM16 IQE) interfaces
usage guidelines....168
channelized OC3 interfaces
usage guidelines....140
channelized T1 (COC48/STM16 IQE) interfaces
usage guidelines....170
channelized T1 (COC48/STM16, SDH mode) IQE interfaces
usage guidelines....179
channelized T1 interfaces
usage guidelines....141
channelized T1 IQ interfaces
usage guidelines....157, 194
channelized T1 IQE interfaces
usage guidelines....156
channelized T3 (COC48/STM16, SDH mode) IQE interfaces
usage guidelines....178
channelized T3 IQ and IQE interfaces
usage guidelines....155
clear channel STM1, STM4, and STM16 interface
usage guide....175
E1 (COC48/STM16) IQE interfaces
usage guidelines....177
NxDS0 (COC48/STM16 IQE) interfaces
usage guidelines....172
NxDS0 (COC48/STM16) IQE interfaces
usage guidelines....178
NxDS0 interfaces
usage guidelines....142, 151
NxDS0 IQ interfaces
usage guidelines....158
SDH (VC-4) interfaces
usage guidelines....148, 154
T1 (COC48/STM16, SDH mode) IQE interfaces
usage guidelines....179
T3 (COC48/STM16, SDH mode) IQE interfaces
usage guidelines....178
T3 IQ and IQE interfaces
usage guidelines....155
physical interfaces
byte encoding....377
C-bit parity mode....379
clock sources....380
time slots....196
fractional E1 IQ and IQE interfaces....195
fractional E1 IQ interfaces....33
fractional T1 interfaces....144
fractional T1 IQE interfaces....172
NxDS0 IQ interfaces....34
physical link down
Channelized DS3 interfaces....244
channelized interfaces....272, 301
Multichannel DS3 interfaces, table....277
physical link up
Channelized DS3 interfaces....243
channelized interfaces....272
Channelized OC12 IQ interfaces....307
physical loopback
Channelized DS3 interfaces....254
channelized interfaces....280, 320
ping interface command
Channelized DS3 interfaces....259
channelized interfaces....285, 327
problems
channelized interfaces, table....277
T1 interfaces, table....277
protect-circuit statement....421

R

request statement....421
revert-time statement....422

S

SDH (VC-4) interfaces
example configuration....148, 154
SDH (VC-4-4C) interface
example configuration....147, 154
set cli terminal command
Channelized OC12 interfaces....305
Multichannel DS3 interfaces....277
set encapsulation command
Channelized DS3 interfaces....257
Channelized OC12 interfaces....325
Channelized OC12 IQ interfaces....325
Multichannel DS3 interfaces....283
set loopback local command
Channelized DS3 interfaces....254
Channelized OC12 interfaces....321

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Channelized OC12 IQ interfaces 321
Multichannel DS3 interfaces 280
set loopback remote command
Channelized DS3 interfaces 262
Channelized OC12 interfaces 331
Channelized OC12 IQ interfaces 331
Multichannel DS3 interfaces 290, 291
set no-keepalives command
Channelized DS3 interfaces 258
Channelized OC12 interfaces 326
Channelized OC12 IQ interfaces 326
Multichannel DS3 interfaces 284
show class-of-service forwarding-table command.....473
show class-of-service interface command.....445
show command 280, 321
show interfaces (Aggregated SONET/SDH) command.....685
show interfaces (Channelized DS3-to-DS0) command.....477, 692, 904
show interfaces (Channelized DS3-to-DS1) command.....488, 703, 915
show interfaces (Channelized E1 IQ) command.....491, 576, 616, 706
show interfaces (Channelized E1) command.....495, 565, 605, 710
show interfaces (Channelized OC12 IQ) command.....506, 661, 721
show interfaces (Channelized OC12) command.....510, 657, 725
show interfaces (Channelized OC3 IQ and IQE) command.....514, 665, 729
show interfaces (Channelized OC48 IQ) command.....748
show interfaces (Channelized STM1 IQ) command.....533, 750
show interfaces (Channelized STM1) command.....536, 753, 852
show interfaces (Channelized T1 IQ) command.....551, 620, 768, 867, 945
show interfaces (Channelized T3 IQ) command.....563, 780, 918
show interfaces (SONET/SDH) command.....782
show interfaces (T1, E1, or DS) command.....580, 632, 810, 879, 920
show interfaces (T3 or E3) command.....835, 957
show interfaces coc1 command 310
show interfaces coc12 command 310
show interfaces command
Channelized DS3 interfaces 241, 255, 258
channelized DS3 to DS0 interfaces 281, 284
Channelized OC12 interfaces 301, 322, 327
Channelized OC12 IQ interfaces 309, 311, 322, 327
controller interface 309
DS3 to DS1interfaces 255, 281
show interfaces controller (Channelized E1 IQ) command.....974
show interfaces controller (Channelized OC12 IQ) command.....975
show interfaces controller (Channelized OC3 IQ and IQE) command.....684, 977
show interfaces controller (Channelized STM1 IQ) command.....978
show interfaces controller (Channelized T1 IQ) command.....980
show interfaces controller (Channelized T3 IQ) command.....982
show interfaces controller command 306
show interfaces ct1 command 310
show interfaces ct3 command 310
show interfaces extensive command
Channelized DS3 interfaces.....244, 260, 263
channelized DS3 to DS0 interfaces.....286, 295
channelized DS3 to DS1 interfaces.....293
Channelized OC12 interfaces.....302, 328, 333
Channelized OC12 IQ interfaces.....328, 336
show interfaces terse coc command 305
show interfaces terse command
Channelized DS3 interfaces 240
Channelized OC12 interfaces 300
Channelized OC12 IQ interfaces 306
SONET parameters
on channelized OC12 interfaces.....134
sonet-options statement.....423
usage guidelines.....134
SONET/SDH interfaces
status information, displaying
aggregated.....685
standard.....782
start-end-flag statement.....425, 439, 442
statistics
channelized interfaces 249, 275
Channelized OC12 interfaces.....304
Channelized OC12 IQ interfaces.....316

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status
Channelized DS3 interfaces 240, 255
channelized interfaces....281, 322
Channelized OC12 interfaces 300
Channelized OC12 IQ interfaces 305
controller interface 311
Multichannel DS3 interfaces 270
status extensive
Channelized DS3 interfaces 244
channelized interfaces 272
Channelized OC12 interfaces 302
Channelized OC12 IQ interfaces 314
status for specific interface
Channelized OC12 301
Channelized OC12 IQ 311
support, technical *See* technical support
switching-mode statement....426
syntax conventions....xxiii
system requirements
channelized IQ interfaces....44

T

T1 interfaces
byte encoding....377
clear statistics command....256, 282, 324
status information, displaying....580, 632, 810, 879, 920
T1 IQ and IQE interfaces
example configuration....157
T1 IQ interfaces
example configuration....210
T1 media alarms, table....267, 295
t1-options statement 254, 262, 280, 291, 427
T3 interfaces
C-bit parity mode....379
status information, displaying....835, 957
T3 IQ and IQE interfaces
example configuration....156
t3-options statement 254, 262, 280, 290, 291, 321, 331, 428
technical support
contacting JTAC....xxv
time slots
channelized E1 IQ and IQE interfaces....195
channelized E1 IQE interfaces....33
channelized NxDS0 IQ interfaces....34, 196
fractional E1 IQ and IQE interfaces....195
fractional E1 IQ interfaces....33
fractional T1 (COC48/STM16 IQE) interfaces....172
fractional T1 interfaces....144
timeslots statement....429
channelized E1 IQ and IQE interfaces
usage guidelines....195
channelized E1 IQ interfaces
usage guidelines....33
channelized E1 IQE interfaces
usage guidelines....33
channelized NxDS0 IQ interfaces
usage guidelines....34, 196
fractional E1 IQ and IQE interfaces
usage guidelines....195
fractional E1 IQ interfaces
usage guidelines....33
fractional E1 IQE interfaces
usage guidelines....33
fractional T1 (COC48/STM16 IQE) interfaces
usage guidelines....172
fractional T1 interfaces
usage guidelines....144
NxDS0 (COC48/STM16 IQE) interfaces
usage guidelines....172
NxDS0 interfaces
usage guidelines....142
translate-discard-eligible statement....430

U

unit statement....431

V

VT mapping
channelized T1 (COC48/STM16 IQE) interfaces....171
channelized T1 interfaces....142, 151
channelized T1 IQ interfaces....128, 158
channelized T1 IQE interfaces....178
vtmapping statement....437
usage guidelines....185

W

working-circuit statement....437

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