



Junos[®] OS

Interfaces Operations Guide



Published: 2011-11-14

Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, California 94089
USA
408-745-2000
www.juniper.net

This product includes the Envoy SNMP Engine, developed by Epilogue Technology, an Integrated Systems Company. Copyright © 1986-1997, Epilogue Technology Corporation. All rights reserved. This program and its documentation were developed at private expense, and no part of them is in the public domain.

This product includes memory allocation software developed by Mark Moraes, copyright © 1988, 1989, 1993, University of Toronto.

This product includes FreeBSD software developed by the University of California, Berkeley, and its contributors. All of the documentation and software included in the 4.4BSD and 4.4BSD-Lite Releases is copyrighted by the Regents of the University of California. Copyright © 1979, 1980, 1983, 1986, 1988, 1989, 1991, 1992, 1993, 1994. The Regents of the University of California. All rights reserved.

GateD software copyright © 1995, the Regents of the University. All rights reserved. Gate Daemon was originated and developed through release 3.0 by Cornell University and its collaborators. Gated is based on Kirton's EGP, UC Berkeley's routing daemon (routed), and DCN's HELLO routing protocol. Development of Gated has been supported in part by the National Science Foundation. Portions of the GateD software copyright © 1988, Regents of the University of California. All rights reserved. Portions of the GateD software copyright © 1991, D. L. S. Associates.

This product includes software developed by Maker Communications, Inc., copyright © 1996, 1997, Maker Communications, Inc.

Juniper Networks, Junos, Steel-Belted Radius, NetScreen, and ScreenOS are registered trademarks of Juniper Networks, Inc. in the United States and other countries. The Juniper Networks Logo, the Junos logo, and JunosE are trademarks of Juniper Networks, Inc. All other trademarks, service marks, registered trademarks, or registered service marks are the property of their respective owners.

Juniper Networks assumes no responsibility for any inaccuracies in this document. Juniper Networks reserves the right to change, modify, transfer, or otherwise revise this publication without notice.

Products made or sold by Juniper Networks or components thereof might be covered by one or more of the following patents that are owned by or licensed to Juniper Networks: U.S. Patent Nos. 5,473,599, 5,905,725, 5,909,440, 6,192,051, 6,333,650, 6,359,479, 6,406,312, 6,429,706, 6,459,579, 6,493,347, 6,538,518, 6,538,899, 6,552,918, 6,567,902, 6,578,186, and 6,590,785.

Junos® operating system (Junos OS) Interfaces Operations Guide

Copyright © 2011, Juniper Networks, Inc.

All rights reserved.

Revision History

29 January 2003—First Edition

30 May 2004—Second Edition

12 January 2007—Revision 1

July 2010—Revision 2

The information in this document is current as of the date listed in the revision history.

YEAR 2000 NOTICE

Juniper Networks hardware and software products are Year 2000 compliant. Junos OS has no known time-related limitations through the year 2038. However, the NTP application is known to have some difficulty in the year 2036.

END USER LICENSE AGREEMENT

The Juniper Networks product that is the subject of this technical documentation consists of (or is intended for use with) Juniper Networks software. Use of such software is subject to the terms and conditions of the End User License Agreement ("EULA") posted at <http://www.juniper.net/support/eula.html>. By downloading, installing or using such software, you agree to the terms and conditions of that EULA.

Abbreviated Table of Contents

	About This Guide	xxi
Part 1	Overview of Interfaces	
Chapter 1	Interfaces Overview	3
Chapter 2	Investigate Interface Steps and Commands	15
Part 2	Investigate T1 Interfaces	
Chapter 3	Monitor T1 Interfaces	23
Chapter 4	Use Loopback Testing for T1 Interfaces	29
Chapter 5	Locate T1 Alarms and Errors	41
Part 3	Investigate T3 Interfaces	
Chapter 6	Monitor T3 Interfaces	49
Chapter 7	Use Loopback Testing for T3 Interfaces	55
Chapter 8	Locate T3 Alarms and Errors	67
Part 4	Investigate ATM Interfaces	
Chapter 9	Determine ATM Interface Type	75
Chapter 10	Monitor ATM Interfaces	85
Chapter 11	Use Loopback Testing for ATM Interfaces	101
Chapter 12	Locate ATM Alarms and Errors	117
Part 5	Investigate SONET Interfaces	
Chapter 13	Monitor SONET Interfaces	127
Chapter 14	Use Loopback Testing for SONET Interfaces	135
Chapter 15	Locate SONET Alarms and Errors	149
Chapter 16	Enable SONET Payload Scrambling	173
Chapter 17	Check the SONET Frame Checksum	177
Part 6	Investigate Fast Ethernet and Gigabit Ethernet Interfaces	
Chapter 18	Monitor Fast Ethernet and Gigabit Ethernet Interfaces	187
Chapter 19	Use Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces	197

Chapter 20	Locate the Fast Ethernet and Gigabit Ethernet LINKAlarm and Counters	209
Part 7	Investigate Channelized Interfaces	
Chapter 21	Monitor Channelized DS3 Interfaces	217
Chapter 22	Use Loopback Testing For Channelized DS3 Interfaces	231
Chapter 23	Locate Channelized DS3 Alarms and Errors	243
Chapter 24	Monitor Multichannel DS3 Interfaces	249
Chapter 25	Use Loopback Testing for Multichannel DS3 Interfaces	259
Chapter 26	Locate Multichannel DS3 Alarms and Errors	275
Chapter 27	Monitor Channelized OC12 Interfaces	283
Chapter 28	Use Loopback Testing for Channelized OC12 Interfaces	303
Chapter 29	Locate Channelized OC12 Alarms and Errors	317
Part 8	Appendix	
Part 9	Index	
	Index	327

Table of Contents

	About This Guide	xxi
	Objectives	xxi
	Audience	xxii
	Supported Routing Platforms	xxii
	Using the Index	xxiii
	Using the Examples in This Manual	xxiii
	Merging a Full Example	xxiii
	Merging a Snippet	xxiv
	Document Conventions	xxiv
	List of Technical Publications	xxv
	Documentation Feedback	xxviii
	Requesting Technical Support	xxix
	Self-Help Online Tools and Resources	xxix
	Opening a Case with JTAC	xxx
Part 1	Overview of Interfaces	
Chapter 1	Interfaces Overview	3
	Interfaces Covered in These Topics	3
	T1 Interfaces	4
	T3 Interfaces	4
	ATM Interfaces	4
	SONET Interfaces	5
	Fast Ethernet and Gigabit Ethernet Interfaces	5
	Channelized Interfaces	5
	Interfaces Supported by the Junos OS	6
	Interface Descriptors	8
	Interface Naming	9
	Interface and Router Clock Sources	13
Chapter 2	Investigate Interface Steps and Commands	15
	Investigate Interface Steps	15
	Monitor Interfaces	16
	Perform a Loopback Test on an Interface	16
	Locate Interface Alarms	18

Part 2	Investigate T1 Interfaces	
Chapter 3	Monitor T1 Interfaces	23
	Checklist for Monitoring T1 Interfaces	23
	Monitor T1 Interfaces	23
	Display the Status of T1 Interfaces	24
	Display the Status of a Specific T1 Interface	25
	Display Extensive Status Information for a Specific T1 Interface	25
	Monitor Statistics for a T1 Interface	26
Chapter 4	Use Loopback Testing for T1 Interfaces	29
	Checklist for Using Loopback Testing for T1 Interfaces	29
	Diagnose a Suspected Hardware Problem with a T1 Interface	30
	Create a Loopback	31
	Create a Physical Loopback	31
	Configure a Local Loopback	31
	Set Clocking to Internal	32
	Verify That the T1 Interface Is Up	33
	Clear T1 Interface Statistics	34
	Force the Link Layer To Stay Up	34
	Configure Encapsulation to Cisco-HDLC	34
	Configure No-Keepalives	35
	Verify the Status of the Logical Interface	36
	Ping the T1 Interface	37
	Check for T1 Interface Error Statistics	37
	Diagnose a Suspected Circuit Problem	39
	Create a Loop from the Router to the Network	39
	Create a Loop to the Router from Various Points in the Network	40
Chapter 5	Locate T1 Alarms and Errors	41
	Checklist for T1 Alarms and Errors	41
	Display T1 Alarms and Errors	41
	Locate Most Common T1 Alarms and Errors	44
	Locate Loss of Signal and Loss of Frame Alarms	44
	Locate Alarm Indication Signal Alarms	45
	Locate an Incoming Yellow Alarm	45
Part 3	Investigate T3 Interfaces	
Chapter 6	Monitor T3 Interfaces	49
	Checklist for Monitoring T3 Interfaces	49
	Monitor T3 Interfaces	49
	Display the Status of T3 Interfaces	50
	Display the Status of a Specific T3 Interface	50
	Display Extensive Status Information for a Specific T3 Interface	51
	Monitor Statistics for a T3 Interface	52

Chapter 7	Use Loopback Testing for T3 Interfaces	55
	Checklist for Using Loopback Testing for T3 Interfaces	55
	Diagnose a Suspected Hardware Problem with a T3 Interface	56
	Create a Loopback	57
	Create a Physical Loopback	57
	Configure a Local Loopback	57
	Set Clocking to Internal	58
	Verify That the T3 Interface Is Up	59
	Clear T3 Interface Statistics	60
	Force the Link Layer To Stay Up	60
	Configure Encapsulation to Cisco-HDLC	60
	Configure No-Keepalives	61
	Verify the Status of the Logical Interface	62
	Ping the T3 Interface	63
	Check for T3 Interface Error Statistics	63
	Diagnose a Suspected Circuit Problem	65
	Create a Loop from the Router to the Network	65
	Create a Loop to the Router from Various Points in the Network	66
Chapter 8	Locate T3 Alarms and Errors	67
	Checklist of Common T3 Alarms and Errors	67
	Display T3 Alarms and Errors	68
	Locate Most Common T3 Alarms and Errors	69
	Locate Loss of Signal and Loss of Frame Alarms	69
	Locate Alarm Indication Signal Alarms	70
	Locate an Incoming Yellow Alarm	71
	Locate IDLE on a T3 Interface	71
Part 4	Investigate ATM Interfaces	
Chapter 9	Determine ATM Interface Type	75
	Checklist for Determining ATM Interface Type	75
	Determine the ATM Interface Type and Configuration	76
	Determine the ATM Interface Type	77
	Check that the ATM Configuration Is Correct	77
	Check the Configuration of an ATM1 Interface	78
	Check the Configuration of an ATM2 IQ Interface	78
	Examples of Incorrect Configurations of ATM Options	79
	Check the Configuration of the VCI on an ATM1 Interface	80
	Check the Configuration of the VCI on an ATM2 IQ Interface	81
	Check the Configuration of Promiscuous Mode on an ATM2 IQ Interface	82
Chapter 10	Monitor ATM Interfaces	85
	Checklist for Monitoring ATM Interfaces	85
	Monitor ATM Interfaces	86
	Monitor ATM1 Interfaces	87
	Display the Status of a Specific ATM1 Interface	87
	Display Extensive Status Information for a Specific ATM1 Interface	87

	Monitor Statistics for an ATM1 Interface	89
	Monitor ATM2 IQ Interfaces	91
	Display the Status of a Specific ATM2 IQ Interface	91
	Display Extensive Information for a Specific ATM2 Interface	93
	Monitor Statistics for an ATM2 Interface	98
Chapter 11	Use Loopback Testing for ATM Interfaces	101
	Checklist for Using Loopback Testing for ATM Interfaces	101
	Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface	102
	Create a Loopback	103
	Create a Physical Loopback	104
	Configure a Local Loopback	104
	Set Clocking to Internal	105
	Verify That the ATM Interface Is Up	106
	Clear ATM Interface Statistics	109
	Ping the ATM Interface	109
	Check for ATM Interface Error Statistics	110
	Diagnose a Suspected Circuit Problem	114
	Create a Loop from the Router to the Network	114
	Create a Loop to the Router from Various Points in the Network	115
Chapter 12	Locate ATM Alarms and Errors	117
	List of Common ATM Alarms and Error	117
	Display ATM1 and ATM2 Alarms and Errors	117
Part 5	Investigate SONET Interfaces	
Chapter 13	Monitor SONET Interfaces	127
	Checklist for Monitoring SONET Interfaces	127
	Monitor SONET Interfaces	127
	Display the Status of SONET Interfaces	128
	Display the Status of a Specific SONET Interface	128
	Display Extensive Status Information for a Specific SONET Interface	130
	Monitor Statistics for a SONET Interface	131
Chapter 14	Use Loopback Testing for SONET Interfaces	135
	Checklist for Using Loopback Testing for SONET Interfaces	135
	Diagnose a Suspected Hardware Problem with a SONET Interface	137
	Create a Loopback	137
	Create a Physical Loopback	137
	Configure a Local Loopback	138
	Set Clocking to Internal	138
	Verify That the SONET Interface Is Up	139
	Clear SONET Interface Statistics	141
	Check That the Received and Transmitted Path Trace Are the Same	141
	Force the Link Layer to Stay Up	142
	Configure Encapsulation to Cisco-HDLC	142
	Configure No-Keepalives	143
	Verify the Status of the Logical Interface	144

	Ping the SONET Interface	145
	Check for SONET Interface Error Statistics	145
	Diagnose a Suspected Circuit Problem	147
	Create a Loop from the Router to the Network	147
	Create a Loop to the Router from Various Points in the Network	148
Chapter 15	Locate SONET Alarms and Errors	149
	List of Common SONET Alarms and Errors	149
	Display SONET Alarms and Errors	151
	Locate Most Common SONET Alarms and Errors	154
	Locate Loss of Signal Alarms	155
	Locate Alarm Indication Signal Alarms	156
	Example of a Router Receiving Only an AIS-P Alarm	156
	Example of a Router Receiving Both an AIS-L and AIS-P Alarm	157
	Locate Remote Defect Indication Alarms	158
	Example of a Router Receiving Only an RDI-P Alarm	158
	Example of a Router Receiving Both an RDI-L and RDI-P Alarm	159
	Locate Remote Error Indication Line Errors	160
	Example of Only an REI-P Counter Incrementing	160
	Example of Both REI-L and REI-P Counters Incrementing	161
	Locate Bit Error Rate Alarms	163
	Locate Payload Label Mismatch Path Alarms	164
	Locate Loss of Pointer Path Alarms	167
	Locate Unequipped Payload Alarms	168
	Locate Phase Lock Loop Alarms	170
Chapter 16	Enable SONET Payload Scrambling	173
	Checklist for Enabling SONET Payload Scrambling	173
	Understand SONET Payload Scrambling	173
	Check SONET HDLC Payload Scrambling	174
	Configure SONET HDLC Payload Scrambling	175
Chapter 17	Check the SONET Frame Checksum	177
	Checklist for Checking the SONET Frame Checksum	177
	Understand the SONET Frame Checksum	178
	Check the SONET Frame Checksum	178
	Examine Output for Framing Errors	178
	Check the FCS Configuration	181
	Configure a SONET Frame Checksum	182
	Return to the Default 16-Bit Checksum	182
	Configure a 16-Bit Checksum	183
	Configure a 32-Bit Checksum	183
Part 6	Investigate Fast Ethernet and Gigabit Ethernet Interfaces	
Chapter 18	Monitor Fast Ethernet and Gigabit Ethernet Interfaces	187
	Checklist for Monitoring Fast Ethernet and Gigabit Ethernet Interfaces	187
	Monitor Fast Ethernet and Gigabit Ethernet Interfaces	188
	Display the Status of Fast Ethernet Interfaces	188
	Display the Status of Gigabit Ethernet Interfaces	189

	Display the Status of a Specific Fast Ethernet or Gigabit Ethernet Interface	190
	Display Extensive Status Information for a Specific Fast Ethernet or Gigabit Ethernet Interface	191
	Monitor Statistics for a Fast Ethernet or Gigabit Ethernet Interface	194
	Fiber-Optic Ethernet Interface Specifications	195
Chapter 19	Use Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces	197
	Checklist for Using Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces	197
	Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface	198
	Create a Loopback	199
	Create a Physical Loopback for a Fiber-Optic Interface	199
	Create a Loopback Plug for an RJ-45 Ethernet Interface	199
	Configure a Local Loopback	200
	Verify That the Fast Ethernet or Gigabit Ethernet Interface Is Up	201
	Configure a Static Address Resolution Protocol Table Entry	202
	Clear Fast Ethernet or Gigabit Ethernet Interface Statistics	204
	Ping the Fast Ethernet or Gigabit Ethernet Interface	204
	Check for Fast Ethernet or Gigabit Ethernet Interface Error Statistics	205
	Diagnose a Suspected Circuit Problem	207
Chapter 20	Locate the Fast Ethernet and Gigabit Ethernet LINKAlarm and Counters	209
	Checklist for Locating Fast Ethernet and Gigabit Ethernet Alarms and Counters	209
	Display the Fast Ethernet or Gigabit Ethernet Interface LINK Alarm	209
	Fast Ethernet and Gigabit Ethernet Counters	211
Part 7	Investigate Channelized Interfaces	
Chapter 21	Monitor Channelized DS3 Interfaces	217
	Checklist for Monitoring Channelized DS3 Interfaces	217
	Monitor Channelized DS3 Interfaces	217
	Display the Status of Channelized DS3 Interfaces	218
	Display the Status of a Specific Channelized DS3 Interface	219
	Display Extensive Status Information for a Specific Channelized DS3 Interface	222
	Monitor Statistics for a Channelized DS3 Interface	227

Chapter 22	Use Loopback Testing For Channelized DS3 Interfaces	231
	Checklist for Using Loopback Testing for Channelized DS3 Interfaces	231
	Diagnose a Suspected Hardware Problem with a Channelized DS3 Interface . .	232
	Create a Loopback	233
	Create a Physical Loopback	233
	Configure a Local Loopback	233
	Verify That the Interface Is Up	234
	Clear Interface Statistics	235
	Force the Link Layer to Stay Up	235
	Configure Encapsulation to Cisco-HDLC	235
	Configure No-Keepalives	236
	Verify the Status of the Logical Interface	237
	Ping the Channelized Interface	238
	Check for Interface Error Statistics	238
	Diagnose a Suspected Circuit Problem	240
	Create a Loop from the Router to the Network	241
	Create a Loop to the Router from Various Points in the Network	241
Chapter 23	Locate Channelized DS3 Alarms and Errors	243
	Checklist for Channelized DS3 Alarms and Errors	243
	Display Alarms and Errors for Channelized DS3 Interfaces	243
Chapter 24	Monitor Multichannel DS3 Interfaces	249
	Checklist for Monitoring Multichannel DS3 Interfaces	249
	Monitor Multichannel DS3 Interfaces	249
	Display the Status of Channelized Interfaces	250
	Display the Status of a Specific Channelized Interface	250
	Display Extensive Status Information for a Specific T3 Interface	252
	Monitor Statistics for a Channelized Interface	255
Chapter 25	Use Loopback Testing for Multichannel DS3 Interfaces	259
	Checklist for Using Loopback Testing for Multichannel DS3 Interfaces	259
	Diagnose a Suspected Hardware Problem with a Multichannel DS3 Interface . .	261
	Create a Loopback	261
	Create a Physical Loopback	261
	Configure a Local Loopback	261
	Verify That the Interface Is Up	262
	Clear Interface Statistics	263
	Force the Link Layer to Stay Up	264
	Configure Encapsulation to Cisco-HDLC	264
	Configure No-Keepalives	265
	Verify the Status of the Logical Interface	265
	Ping the Channelized Interface	266
	Check for Interface Error Statistics	267
	Diagnose a Suspected Circuit Problem	271
	Create a Loop from the Router to the Network	271
	Loop the Entire T3 Interface towards the Network	271
	Loop a Particular T1 Channel towards the Network	272
	Create a Loop to the Router from Various Points in the Network	272

Chapter 26	Locate Multichannel DS3 Alarms and Errors	275
	Checklist for Locating Multichannel DS3 Alarms and Errors	275
	Display Alarms and Errors for Channelized DS3 to DS1 Interfaces	275
	Display Alarms and Errors for Channelized DS3 to DS0 Interfaces	278
Chapter 27	Monitor Channelized OC12 Interfaces	283
	Checklist for Monitoring Channelized OC12 Interfaces	283
	Monitor Channelized OC12 Interfaces	284
	Display the Status of Channelized OC12 Interfaces	284
	Display the Status of a Specific Channelized OC12 Interface	285
	Display Extensive Status Information for a Specific Channelized OC12 Interface	285
	Monitor Statistics for a Channelized OC12 Interface	288
	Monitor Channelized OC12 IQ Interfaces	289
	Display the Status of a Channelized OC12 IQ Interface	289
	Display the Status of the Controller Channelized OC12 IQ Interface	293
	Display the Status of a Specific Channel of a Channelized OC12 IQ Interface	295
	Display Extensive Status Information for a Channelized OC12 IQ Interface	297
	Monitor Statistics for a Channelized OC12 IQ Interface	300
Chapter 28	Use Loopback Testing for Channelized OC12 Interfaces	303
	Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces	303
	Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface	305
	Create a Loopback	305
	Create a Physical Loopback	305
	Configure a Local Loopback	305
	Verify That the Interface Is Up	306
	Clear Interface Statistics	309
	Force the Link Layer to Stay Up	309
	Configure Encapsulation to Cisco-HDLC	310
	Configure No-Keepalives	310
	Verify the Status of the Logical Interface	311
	Ping the Channelized Interface	312
	Check for Interface Error Statistics	313
	Diagnose a Suspected Circuit Problem	315
	Loop the Entire T3 Interface Towards the Network	315
	Create a Loop to the Router from Various Points in the Network	316
Chapter 29	Locate Channelized OC12 Alarms and Errors	317
	Checklist for Channelized OC12 Alarms and Errors	317
	Display Channelized OC12 Alarms and Errors	317
	Display Channelized OC12 IQ Alarms and Errors	321

Part 8	Appendix	
Part 9	Index	
	Index	327

List of Figures

Part 1	Overview of Interfaces	
Chapter 1	Interfaces Overview	3
	Figure 1: Interface Slot, PIC, and Port Locations	11
	Figure 2: Clock Sources	14
Part 2	Investigate T1 Interfaces	
Chapter 5	Locate T1 Alarms and Errors	41
	Figure 3: Location of an LOS or LOF Alarm in a T1 Network	44
	Figure 4: Location of an AIS Alarm in a T1 Network	45
	Figure 5: Location of a Yellow Alarm in a T1 Network	45
Part 3	Investigate T3 Interfaces	
Chapter 8	Locate T3 Alarms and Errors	67
	Figure 6: Location of an LOS or LOF Alarm in a T3 Network	70
	Figure 7: Location of an AIS Alarm in a T3 Network	70
	Figure 8: Location of a Yellow Alarm in a T3 Network	71
Part 4	Investigate ATM Interfaces	
Chapter 11	Use Loopback Testing for ATM Interfaces	101
	Figure 9: Local Loopback	104
	Figure 10: Loop from the Router to the Network	114
Part 5	Investigate SONET Interfaces	
Chapter 15	Locate SONET Alarms and Errors	149
	Figure 11: Example of a SONET Network	152
	Figure 12: Example of an Upstream or Downstream Failure	153
	Figure 13: Another Example of an Upstream or Downstream Failure	153
	Figure 14: Location of an LOS Alarm in a SONET Network	155
	Figure 15: Example of a Router Receiving Only an AIS-P Alarm	157
	Figure 16: Example of a Router Receiving Both an AIS-L and an AIS-P Alarm	157
	Figure 17: Example of a Router Receiving Only an RDI-P Alarm	159
	Figure 18: Example of a Router Receiving Both an RDI-L and RDI-P Alarm	159
	Figure 19: Example of a Router Receiving Only an REI-P Counter Incrementing	161
	Figure 20: Example of a Router Receiving Both An REI-L and REI-P Counter Incrementing	162

Part 6	Investigate Fast Ethernet and Gigabit Ethernet Interfaces	
Chapter 19	Use Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces	197
	Figure 21: RJ-45 Ethernet Loopback Plug	200
Part 7	Investigate Channelized Interfaces	
Chapter 27	Monitor Channelized OC12 Interfaces	283
	Figure 22: Sample Configuration of Channelized OC12 IQ Interface	291
	Figure 23: Controller Interfaces at Different Levels of Channelization	294
	Figure 24: Specific Channels of a Channelized OC12 IQ Interface	297

List of Tables

	About This Guide	xxi
	Table 1: Notice Icons	xxiv
	Table 2: Technical Documentation for Supported Routing Platforms	xxv
	Table 3: Junos OS Network Operations Guides	xxvi
	Table 4: Junos OS for J-series Services Routers and SRX-series Services Gateways Documentation	xxvii
	Table 5: Additional Books Available Through http://www.juniper.net/books ..	xxviii
Part 1	Overview of Interfaces	
Chapter 1	Interfaces Overview	3
	Table 6: Interface Types Supported by the Junos OS	6
Chapter 2	Investigate Interface Steps and Commands	15
	Table 7: Commands Used to Monitor Interfaces	16
	Table 8: Commands Used to Perform Loopback Testing on Interfaces	17
Part 2	Investigate T1 Interfaces	
Chapter 3	Monitor T1 Interfaces	23
	Table 9: Checklist for Monitoring T1 Interfaces	23
	Table 10: Status of T1 Interfaces	24
	Table 11: Problem Situations and Actions	27
Chapter 4	Use Loopback Testing for T1 Interfaces	29
	Table 12: Checklist for Using Loopback Testing for T1 Interfaces	29
Chapter 5	Locate T1 Alarms and Errors	41
	Table 13: Checklist for T1 Alarms and Errors	41
	Table 14: T1 Interface Alarms and Error Definitions	43
Part 3	Investigate T3 Interfaces	
Chapter 6	Monitor T3 Interfaces	49
	Table 15: Checklist for Monitoring T3 Interfaces	49
	Table 16: Status of T3 Interfaces	50
	Table 17: Problem Situations and Actions	53
Chapter 7	Use Loopback Testing for T3 Interfaces	55
	Table 18: Checklist for Using Loopback Testing for T3 Interfaces	55
Chapter 8	Locate T3 Alarms and Errors	67
	Table 19: Checklist of Common T3 Alarms and Errors	67

	Table 20: T3 Interface Error Counter Definitions	69
Part 4	Investigate ATM Interfaces	
Chapter 9	Determine ATM Interface Type	75
	Table 21: Checklist for Determining ATM Interface Type	75
Chapter 10	Monitor ATM Interfaces	85
	Table 22: Checklist for Monitoring ATM Interfaces	85
	Table 23: Status of ATM Interfaces	86
Chapter 11	Use Loopback Testing for ATM Interfaces	101
	Table 24: Checklist for Using Loopback Testing for ATM Interfaces	101
	Table 25: Problems and Solutions for a Physical Link That Is Down	108
Chapter 12	Locate ATM Alarms and Errors	117
	Table 26: List of Common ATM Alarms and Error	117
	Table 27: ATM Interface Input and Output Errors	122
	Table 28: ATM Active Alarms and Defects	123
Part 5	Investigate SONET Interfaces	
Chapter 13	Monitor SONET Interfaces	127
	Table 29: Checklist for Monitoring SONET Interfaces	127
	Table 30: Status of SONET Interfaces	128
	Table 31: SONET Error Statistics	132
Chapter 14	Use Loopback Testing for SONET Interfaces	135
	Table 32: Checklist for Using Loopback Testing for SONET Interfaces	135
	Table 33: Problems and Solutions for a Physical Link That Is Down	140
Chapter 15	Locate SONET Alarms and Errors	149
	Table 34: List of Common SONET Alarms and Errors	149
	Table 35: STS Path Signal Label Assignments	166
	Table 36: Location of the Onboard Clock	171
Chapter 16	Enable SONET Payload Scrambling	173
	Table 37: Checklist for Enabling SONET Payload Scrambling	173
Chapter 17	Check the SONET Frame Checksum	177
	Table 38: Checklist for Checking the SONET Frame Checksum	177
Part 6	Investigate Fast Ethernet and Gigabit Ethernet Interfaces	
Chapter 18	Monitor Fast Ethernet and Gigabit Ethernet Interfaces	187
	Table 39: Checklist for Monitoring Fast Ethernet and Gigabit Ethernet Interfaces	187
	Table 40: Status of Fast Ethernet Interfaces	189
	Table 41: Status of Gigabit Ethernet Interfaces	190
	Table 42: Errors to Look For	192
	Table 43: MAC Statistics Errors	193
	Table 44: Autonegotiation Information	193
	Table 45: Fiber-Optic Ethernet Interface Specifications	195

Chapter 19	Use Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces	197
	Table 46: Checklist for Using Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces	197
	Table 47: Problems and Solutions for a Physical Link That Is Down	202
Chapter 20	Locate the Fast Ethernet and Gigabit Ethernet LINKAlarm and Counters	209
	Table 48: Checklist for Locating Fast Ethernet and Gigabit Ethernet Alarms and Counters	209
	Table 49: Major Fast Ethernet and Gigabit Ethernet Counters	211
Part 7	Investigate Channelized Interfaces	
Chapter 21	Monitor Channelized DS3 Interfaces	217
	Table 50: Checklist for Monitoring Channelized DS3 Interfaces	217
Chapter 22	Use Loopback Testing For Channelized DS3 Interfaces	231
	Table 51: Checklist for Using Loopback Testing for Channelized DS3 Interfaces	231
Chapter 23	Locate Channelized DS3 Alarms and Errors	243
	Table 52: Checklist for Channelized DS3 Alarms and Errors	243
	Table 53: T1 Media Alarms and Error Definitions	247
Chapter 24	Monitor Multichannel DS3 Interfaces	249
	Table 54: Checklist for Monitoring Multichannel DS3 Interfaces	249
	Table 55: Problem Situations and Actions	257
Chapter 25	Use Loopback Testing for Multichannel DS3 Interfaces	259
	Table 56: Checklist for Using Loopback Testing for Multichannel DS3 Interfaces	259
Chapter 26	Locate Multichannel DS3 Alarms and Errors	275
	Table 57: Checklist for Multichannel DS3 Alarms and Errors	275
	Table 58: T1 Media Alarms and Error Definitions	277
	Table 59: T3 Interface Error Counter Definitions	280
Chapter 27	Monitor Channelized OC12 Interfaces	283
	Table 60: Checklist for Monitoring Channelized OC12 Interfaces	283
Chapter 28	Use Loopback Testing for Channelized OC12 Interfaces	303
	Table 61: Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces	304
Chapter 29	Locate Channelized OC12 Alarms and Errors	317
	Table 62: Checklist for Channelized OC12 Alarms and Errors	317
	Table 63: T3 Interface Error Counter Definitions	320

About This Guide

This preface provides the following guidelines for using the *Junos[®] operating system (Junos OS) Interfaces Network Operations Guide*:

- [Objectives on page xxi](#)
- [Audience on page xxii](#)
- [Supported Routing Platforms on page xxii](#)
- [Using the Index on page xxiii](#)
- [Using the Examples in This Manual on page xxiii](#)
- [Document Conventions on page xxiv](#)
- [List of Technical Publications on page xxv](#)
- [Documentation Feedback on page xxviii](#)
- [Requesting Technical Support on page xxix](#)

Objectives

This guide provides operational information helpful in monitoring router interfaces and isolating potential problems. This guide is not directly related to any particular release of the Junos operating system (Junos OS).

For information about configuration statements and guidelines related to the commands described in this reference, see the following configuration guides:

- *Junos Network Interfaces Configuration Guide*—Includes configuration statements and guidelines for bit error rate test (BERT) parameters and Automatic Protection Switching (APS).
- *Junos Services Interfaces Configuration Guide*—Includes configuration statements and guidelines for real-time performance monitoring (RPM) and all services, such as Compressed Real-Time Transport Protocol (CRTP), Data Link Switching (DLSw), flow collection and monitoring, and stateful firewall filters.
- *Junos OS CLI User Guide*—Describes how to use the Junos OS command-line interface (CLI) to configure, monitor, and manage Juniper Networks routing platforms.
- *Junos System Basics Configuration Guide*—Describes Juniper Networks routing platforms, and provides information about how to configure basic system parameters, supported protocols and software processes, authentication, and a variety of utilities for managing your router on the network.

For information about related tasks performed by Network Operations Center (NOC) personnel, see the following network operations guides:

- *Junos Baseline Network Operations Guide*
- *Junos Hardware Network Operations Guide*



NOTE: To obtain the most current version of this manual, see the product documentation page on the Juniper Networks Web site, located at <http://www.juniper.net/>.

Audience

This guide is designed for Network Operations Center (NOC) personnel who monitor a Juniper Networks M Series or T Series routing platform.

To use this guide, you need a broad understanding of networks in general, the Internet in particular, networking principles, and network configuration. You must also be familiar with one or more of the following Internet routing protocols:

- Border Gateway Protocol (BGP)
- Routing Information Protocol (RIP)
- Intermediate System-to-Intermediate System (IS-IS)
- Open Shortest Path First (OSPF)
- Internet Control Message Protocol (ICMP) router discovery
- Internet Group Management Protocol (IGMP)
- Distance Vector Multicast Routing Protocol (DVMRP)
- Protocol-Independent Multicast (PIM)
- Multiprotocol Label Switching (MPLS)
- Resource Reservation Protocol (RSVP)
- Simple Network Management Protocol (SNMP)

Supported Routing Platforms

For the features described in this manual, Junos OS currently supports the following routing platforms:

- M Series
- T Series

Using the Index

This guide contains a complete index. For a list and description of glossary terms, see the *Junos OS Comprehensive Index and Glossary*.

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.

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.xml;
    }
  }
}
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.xml; }
```

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 [Junos OS CLI User Guide](#).

Document Conventions

Table 1 on page xxiv 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.

List of Technical Publications

Table 2 on page xxv lists the software and hardware guides and release notes for Juniper Networks M-series, MX-series, and T-series routing platforms and describes the contents of each document. Table 3 on page xxvi lists the books included in the *Network Operations Guide* series. Table 4 on page xxvii lists the manuals and release notes supporting Junos OS for J-series and SRX-series platforms. All documents are available at <http://www.juniper.net/techpubs/>.

Table 5 on page xxviii lists additional books on Juniper Networks solutions that you can order through your bookstore. A complete list of such books is available at <http://www.juniper.net/books>.

Table 2: Technical Documentation for Supported Routing Platforms

Book	Description
Hardware Documentation	
<i>Hardware Guide</i>	Describes how to install, maintain, and troubleshoot routing platforms and components. Each platform has its own hardware guide.
<i>PIC Guide</i>	Describes the routing platform's Physical Interface Cards (PICs). Each platform has its own PIC guide.
<i>DPC Guide</i>	Describes the Dense Port Concentrators (DPCs) for all MX-series routers.
Junos Scope Documentation	
<i>Junos Scope Software User Guide</i>	Describes the Junos Scope software graphical user interface (GUI), how to install and administer the software, and how to use the software to manage routing platform configuration files and monitor routing platform operations.
Advanced Insight Solutions (AIS) Documentation	
<i>Advanced Insight Solutions Guide</i>	Describes the Advanced Insight Manager (AIM) application, which provides a gateway between Junos devices and Juniper Support Systems (JSS) for case management and intelligence updates. Explains how to run AI-Scripts on Juniper Networks devices.
Release Notes	
<i>Junos OS Release Notes</i>	Summarize new features and known problems for a particular software release, provide corrections and updates to published Junos, Junos XML protocol, and NETCONF manuals, provide information that might have been omitted from the manuals, and describe upgrade and downgrade procedures.
<i>Hardware Release Notes</i>	Describe the available documentation for the routing platform and summarize known problems with the hardware and accompanying software. Each platform has its own release notes.

Table 2: Technical Documentation for Supported Routing Platforms (*continued*)

Book	Description
<i>Junos Scope Release Notes</i>	Contain corrections and updates to the published Junos Scope manual, provide information that might have been omitted from the manual, and describe upgrade and downgrade procedures.
<i>AIS Release Notes</i>	Summarize AIS new features and guidelines, identify known and resolved problems, provide information that might have been omitted from the manuals, and provide initial setup, upgrade, and downgrade procedures.
<i>AIS AI-Scripts Release Notes</i>	Summarize AI-Scripts new features, identify known and resolved problems, provide information that might have been omitted from the manuals, and provide instructions for automatic and manual installation, including deleting and rolling back.

Table 3: Junos OS Network Operations Guides

Book	Description
<i>Baseline</i>	Describes the most basic tasks for running a network using Juniper Networks products. Tasks include upgrading and reinstalling Junos OS, gathering basic system management information, verifying your network topology, and searching log messages.
<i>Interfaces</i>	Describes tasks for monitoring interfaces. Tasks include using loopback testing and locating alarms.
<i>MPLS</i>	Describes tasks for configuring, monitoring, and troubleshooting an example MPLS network. Tasks include verifying the correct configuration of the MPLS and RSVP protocols, displaying the status and statistics of MPLS running on all routing platforms in the network, and using the layered MPLS troubleshooting model to investigate problems with an MPLS network.
<i>MPLS Log Reference</i>	Describes MPLS status and error messages that appear in the output of the show mpls lsp extensive command. The guide also describes how and when to configure Constrained Shortest Path First (CSPF) and RSVP trace options, and how to examine a CSPF or RSVP failure in a sample network.
<i>MPLS Fast Reroute</i>	Describes operational information helpful in monitoring and troubleshooting an MPLS network configured with fast reroute (FRR) and load balancing.
<i>Hardware</i>	Describes tasks for monitoring M-series and T-series routing platforms.

To configure and operate a J-series Services Router or an SRX-series Services Gateway running Junos OS, you must also use the configuration statements and operational mode commands documented in Junos configuration guides and command references. To

configure and operate a WX Integrated Services Module, you must also use WX documentation.

Table 4: Junos OS for J-series Services Routers and SRX-series Services Gateways Documentation

Book	Description
J-series and SRX-series Platforms	
<i>Junos OS Interfaces and Routing Configuration Guide</i>	Explains how to configure SRX-series and J-series interfaces for basic IP routing with standard routing protocols, ISDN service, firewall filters (access control lists), and class-of-service (CoS) traffic classification.
<i>Junos OS Security Configuration Guide</i>	Explains how to configure and manage SRX-series and J-series security services such as stateful firewall policies, IPsec VPNs, firewall screens, Network Address Translation (NAT), Public Key Cryptography, chassis clusters, Application Layer Gateways (ALGs), and Intrusion Detection and Prevention (IDP).
<i>Junos OS Administration Guide for Security Devices</i>	Shows how to monitor SRX-series and J-series devices and routing operations, firewall and security services, system alarms and events, and network performance. This guide also shows how to administer user authentication and access, upgrade software, and diagnose common problems.
<i>Junos OS CLI Reference</i>	Provides the complete configuration hierarchy available on SRX-series and J-series devices. This guide also describes the configuration statements and operational mode commands unique to these devices.
<i>Network and Security Manager: Configuring J Series Services Routers and SRX Series Services Gateways Guide</i>	Explains how to configure, manage, and monitor J-series Services Routers and SRX-series services gateways through NSM.
<i>Junos OS Release Notes</i>	Summarize new features and known problems for a particular release of Junos OS, including Junos OS for J-series and SRX-series devices. The release notes also contain corrections and updates to the manuals and software upgrade and downgrade instructions for Junos OS.
J-series Only	
<i>Junos OS Design and Implementation Guide</i>	Provides guidelines and examples for designing and implementing IPsec VPNs, firewalls, and routing on J-series Services Routers running Junos OS.
<i>J Series Services Routers Quick Start</i>	Explains how to quickly set up a J-series Services Router. This document contains router declarations of conformity.
<i>JUNOS Software with Enhanced Services J-series Services Router Hardware Guide</i>	Provides an overview, basic instructions, and specifications for J-series Services Routers. This guide explains how to prepare a site, unpack and install the router, replace router hardware, and establish basic router connectivity. This guide contains hardware descriptions and specifications.

Table 4: Junos OS for J-series Services Routers and SRX-series Services Gateways Documentation (*continued*)

Book	Description
<i>Junos OS Migration Guide</i>	Provides instructions for migrating an SSG device running ScreenOS software to Junos OS or upgrading a J-series device to a later version of the Junos OS.
<i>WXC Integrated Services Module Installation and Configuration Guide</i>	Explains how to install and initially configure a WXC Integrated Services Module in a J-series Services Router for application acceleration.

Table 5: Additional Books Available Through <http://www.juniper.net/books>

Book	Description
<i>Interdomain Multicast Routing</i>	Provides background and in-depth analysis of multicast routing using Protocol Independent Multicast sparse mode (PIM SM) and Multicast Source Discovery Protocol (MSDP); details any-source and source-specific multicast delivery models; explores multiprotocol BGP (MBGP) and multicast IS-IS; explains Internet Gateway Management Protocol (IGMP) versions 1, 2, and 3; lists packet formats for IGMP, PIM, and MSDP; and provides a complete glossary of multicast terms.
<i>Junos Cookbook</i>	Provides detailed examples of common Junos OS configuration tasks, such as basic router configuration and file management, security and access control, logging, routing policy, firewalls, routing protocols, MPLS, and VPNs.
<i>MPLS-Enabled Applications</i>	Provides an overview of Multiprotocol Label Switching (MPLS) applications (such as Layer 3 virtual private networks [VPNs], Layer 2 VPNs, virtual private LAN service [VPLS], and pseudowires), explains how to apply MPLS, examines the scaling requirements of equipment at different points in the network, and covers the following topics: point-to-multipoint label switched paths (LSPs), DiffServ-aware traffic engineering, class of service, interdomain traffic engineering, path computation, route target filtering, multicast support for Layer 3 VPNs, and management and troubleshooting of MPLS networks.
<i>OSPF and IS-IS: Choosing an IGP for Large-Scale Networks</i>	Explores the full range of characteristics and capabilities for the two major link-state routing protocols: Open Shortest Path First (OSPF) and IS-IS. Explains architecture, packet types, and addressing; demonstrates how to improve scalability; shows how to design large-scale networks for maximum security and reliability; details protocol extensions for MPLS-based traffic engineering, IPv6, and multitopology routing; and covers troubleshooting for OSPF and IS-IS networks.
<i>Routing Policy and Protocols for Multivendor IP Networks</i>	Provides a brief history of the Internet, explains IP addressing and routing (Routing Information Protocol [RIP], OSPF, IS-IS, and Border Gateway Protocol [BGP]), explores ISP peering and routing policies, and displays configurations for both Juniper Networks and other vendors' routers.
<i>The Complete IS-IS Protocol</i>	Provides the insight and practical solutions necessary to understand the IS-IS protocol and how it works by using a multivendor, real-world approach.

Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can send your comments to

techpubs-comments@juniper.net, or fill out the documentation feedback form at <https://www.juniper.net/cgi-bin/docbugreport/> . If you are using e-mail, be sure to include the following information with your comments:

- Document or topic name
- URL or page number
- Software release 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 postsales 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:

- Find CSC offerings: <http://www.juniper.net/customers/support/>
- 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: <https://www.juniper.net/alerts/>
- 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, visit us at <http://www.juniper.net/support/requesting-support.html>

PART 1

Overview of Interfaces

- [Interfaces Overview on page 3](#)
- [Investigate Interface Steps and Commands on page 15](#)

CHAPTER 1

Interfaces Overview

This manual describes the steps you take to investigate interface problems. For each interface type, the investigation process is described in three corresponding chapters:

- Monitor the interface
- Perform a loopback test on the interface
- Locate alarms and errors

The monitor interfaces chapter helps you determine the nature of the interface problem. The loopback test chapter provides information to assist you isolate the source of the problem, and the locate alarms and errors chapter explains some of the alarms and errors for that occur on that interface.

This chapter discusses the following topics:

- [Interfaces Covered in These Topics on page 3](#)
- [Interfaces Supported by the Junos OS on page 6](#)
- [Interface Descriptors on page 8](#)
- [Interface Naming on page 9](#)
- [Interface and Router Clock Sources on page 13](#)

Interfaces Covered in These Topics

This book describes the investigation process for the following interfaces:

- T1
- T3
- Asynchronous Transfer Mode (ATM) 1 and ATM 2 intelligent queuing (IQ)
- SONET
- Fast Ethernet and Gigabit Ethernet
- Channelized DS3
- Multichannel DS3

- Channelized OC12
- Channelized OC12 IQ

T1 Interfaces

T1 is the basic physical layer protocol used by the Digital Signal level 1 (DS1) multiplexing method in North America. A T1 interface operates at a bit rate of 1.544 Mbps and can support 24 DS0 channels. The supported DS1 standards include:

- ANSI T1.107, T1.102
- GR 499-core, GR 253-core
- AT&T Pub 54014
- ITUG.751, G.703

T3 Interfaces

T3 is the physical layer protocol used by the Digital Signal level 3 (DS3) multiplexing method in North America. A T3 interface operates at a bit rate of 44.736 Mbps. The Junos OS supports payload scrambling and subrate operation on each physical T3 interface. One encapsulation format—Point-to-Point Protocol (PPP), Frame Relay, or High-level Data Link Control (HDLC)—must be configured for the interface. The supported DS3 standards include:

- ANSI T1.107, T1.102
- GR 499-core, GR 253-core
- Bellcore TR-TSY-000009
- AT&T Pub 54014
- ITU G.751, G.703, G823

ATM Interfaces

ATM is a network protocol designed to facilitate the simultaneous handling of various types of traffic streams (voice, data, and video) at very high speeds over the same physical connection. By always using 53-byte cells, ATM simplifies the hardware design, enabling it to quickly determine the destination address of each cell. This allows simple switching of network traffic at much higher speeds than are easily accomplished using protocols with variable sizes of transfer units, such as Frame Relay and the Transmission Control Protocol/Internet Protocol (TCP/IP).

Although ATM was designed to operate without requiring any other networking protocol, other protocols are frequently segmented and encapsulated across multiple, smaller ATM cells, in effect making ATM a transport mechanism for preexisting technologies such as Frame Relay and the TCP/IP family of protocols.

ATM relies on the concepts of virtual paths and virtual circuits. A virtual path, represented by a specific virtual path identifier (VPI), establishes a route between two devices in a

network. Each VPI can contain multiple virtual circuits, each represented by a virtual circuit identifier (VCI).

VPIs and VCIs are local to the router, which means that only the two devices connected by the VCI or VPI need to know the details of the connection. In a typical ATM network, user data might traverse multiple connections, using many different VPI and VCI connections. Each end device, just as each device in the network, needs to know only the VCI and VPI information for the path to the next device.

With the second-generation ATM2 IQ interface, you can configure virtual path shaping and operation, administration, and maintenance (OAM) F4 cell flows.

SONET Interfaces

SONET is widely used in the USA for very high-speed transmission of voice and data signals across the numerous world-wide fiber-optic networks.

SONET uses LEDs or lasers to transmit a binary stream of light-on and light-off sequences at a constant rate. At the far end, optical sensors convert the pulses of light back to electrical representations of the binary information.

In wavelength-division multiplexing (WDM), light at several different wavelengths (or colors to a human eye) is transmitted on the same fiber segment, greatly increasing the throughput of each fiber cable.

In dense wavelength-division multiplexing (DWDM), many optical data streams at different wavelengths are combined into one fiber.

The basic building block of the SONET hierarchy in the optical domain is OC1; in the electrical domain, the basic building block is STS1. OC1 operates at 51.840 Mbps. OC3 operates at 155.520 Mbps.

A SONET stream can consist of discrete lower-rate traffic flows that have been combined using Time-Division Multiplexing (TDM) techniques. This method is useful, but a portion of the total bandwidth is consumed by the TDM overhead. When a SONET stream consists of only a single, very high-speed payload, it is referred to as operating in concatenated mode. A SONET interface operating in this mode has a "c" added to the rate descriptor. For example, a concatenated OC48 interface is referred to as OC-48c.

Fast Ethernet and Gigabit Ethernet Interfaces

Ethernet was developed in the early 1970s at the Xerox Palo Alto Research Center (PARC) as a data-link control layer protocol for interconnecting computers. It was first widely used at 10 Mbps over coaxial cables and later over unshielded twisted pairs using 10BaseT. More recently, 100BaseTX (Fast Ethernet, 100 Mbps), Gigabit Ethernet (1 Gbps), and 10-Gigabit Ethernet (10 Gbps) have become available.

Channelized 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. Original channelized interfaces provide

a single level of channelization. The newer IQ channelized PICs provide multiple levels of channelization.

Interfaces Supported by the Junos OS

The Junos OS supports a greater range of interfaces than those described in this book. Future revisions of this book will include the steps for monitoring additional interfaces supported by the Junos OS. [Table 6 on page 6](#) lists the interface types supported by the Junos OS and shows the interface name as it appears in a configuration.

Table 6: Interface Types Supported by the Junos OS

Interface Name in Configuration	Interface Type	Description
ae	Aggregated Ethernet	A virtual aggregated link.
as	Aggregated SONET/SDH	A virtual aggregated link.
at	ATM1 or ATM2 IQ	Asynchronous Transfer Mode
cau4	Channelized AU-4 IQ	Configured on the Channelized STM1 IQ PIC.
coc1	Channelized OC1 IQ	Configured on the Channelized OC12 IQ PIC.
coc12	Channelized OC12 IQ	Configured on the Channelized OC12 IQ PIC.
cstm1	Channelized STM1 IQ	Configured on the Channelized STM1 IQ PIC.
ce1	Channelized E1 IQ	Configured on the Channelized E1 IQ PIC or Channelized STM1 IQ PIC.
ct1	Channelized T1 IQ	Configured on the Channelized DS3 IQ PIC or Channelized OC12 IQ PIC.
ct3	Channelized T3 IQ	Configured on the Channelized DS3 IQ PIC or Channelized OC12 IQ PIC.
cp	Collector	Configured on the Monitoring Services II PIC.
ds	DS0	Configured on the Channelized DS3 to DS0 PIC, Channelized E1 PIC, Channelized OC12 IQ PIC, Channelized DS3 IQ PIC, Channelized E1 IQ PIC, or Channelized STM1 IQ PIC.
dsc	Discard	Allows you to identify the ingress point of a denial-of-service (DoS) attack.
e1	E1	Includes the channelized STM1 to E1 interfaces.
e3	E3	Includes the E3 IQ interfaces.

Table 6: Interface Types Supported by the Junos OS (*continued*)

Interface Name in Configuration	Interface Type	Description
es	Encryption	Allows you to configure a security association (SA) name with a logical interface.
fe	Fast Ethernet	100Base-TX (Fast Ethernet, 100 Mbps).
fxp	Management and internal Ethernet	The management Ethernet interface is an out-of-band management interface within the routing platform. The internal Ethernet interface connects the Routing Engine to the Packet Forwarding Engine.
ge	Gigabit Ethernet	Includes Gigabit Ethernet IQ interfaces.
gr	Generic Route Encapsulation tunnel	Allows you to configure a unicast tunnel using GRE encapsulation.
gre	Internally generated	This interface is internally generated and is not configurable.
ipH	IP-over-IP encapsulation tunnel	Allows you to configure a unicast tunnel using IP-IP encapsulation.
ipip	Internally generated	This interface is internally generated and is not configurable.
lo	Loopback	This interface is internally generated. The logical interface lo0.16383 is a non-configurable interface for routing platform control traffic.
ls	Link services	Supports bundles that contain links.
lsi	Internally generated	This interface is internally generated and is not configurable.
ml	Multilink	Includes Multilink Frame Relay and Multilink PPP.
mo	Monitoring services	Includes the monitoring services and monitoring services II interfaces. The logical interface mo-fpc/plc/port .16383 is an internally generated, non-configurable interface for routing platform control traffic.
mt	Multicast tunnel	Internal routing platform interface for VPNs.
mtun	Internally generated	This interface is internally generated and is not configurable.
oc3	OC3 IQ	Configured on the Channelized OC12 IQ PIC.
pe	This interface is present on the first-hop routing platform	Encapsulates packets destined for the rendezvous point (RP) routing platform.

Table 6: Interface Types Supported by the Junos OS (*continued*)

Interface Name in Configuration	Interface Type	Description
pd	This interface is present on the RP	De-encapsulates packets at the RP.
pimd	Internally generated	This interface is internally generated and is not configurable.
pime	Internally generated	This interface is internally generated and is not configurable.
se	Serial	Includes the EIA-530, V.35, and X.21 interfaces.
so	SONET/SDH	Both are widely used methods for very high speed transmission of voice and data signals across the numerous world-wide fiber-optic networks.
sp	Adaptive services	The logical interface sp-<i>fpc/pic/port</i>.16383 is an internally generated, non-configurable interface for routing platform control traffic.
t1	T1	Includes the channelized DS3 to DS1 interfaces.
t3	T3	Includes the channelized OC12 to DS3 interfaces.
tap	Internally generated	This interface is internally generated and is not configurable.
vsp	Voice services	The Adaptive Services (AS) Physical Interface Card (PIC) supports the compressed real-time transport protocol (RTP) on this interface.
vt	Virtual loopback tunnel	On routing platforms equipped with a Tunnel PIC, enables egress filtering.

Interface Descriptors

When you configure an interface, you are specifying the properties for a physical interface descriptor. In most cases, the physical interface descriptor corresponds to a single physical device and consists of the following parts:

- The interface name, which defines the media type
- The slot in which the Flexible PIC Concentrator (FPC) is located
- The location on the FPC in which the PIC is installed
- The PIC port
- The channel and logical unit numbers of the interface (optional)

Each physical interface descriptor can contain one or more logical interface descriptors. These allow you to map one or more logical (or virtual) interfaces to a single physical device. Creating multiple logical interfaces is useful for ATM, Frame Relay, and Gigabit Ethernet networks, in which you can associate multiple virtual circuits, data-link connections, or virtual LANs (VLANs) with a single interface device.

Each logical interface descriptor can have one or more family descriptors to define the protocol family that it is associated with and are allowed to run over the logical interface. The following protocol families are supported:

- Internet Protocol version 4 (IPv4)
- Internet Protocol version 6 (IPv6)
- Circuit cross-connect (CCC)
- Translational cross-connect (TCC)
- International Organization for Standardization (ISO)
- Multilink Frame Relay (MLFR)
- Multilink PPP (MLPPP)
- Multiprotocol Label Switching (MPLS)
- Trivial Network Protocol (TNP)

Each family descriptor can have one or more address entries, which associate a network address with a logical interface and hence with the physical interface.

You configure the various interface descriptors as follows:

- Configure the physical interface descriptor by including the **interfaces *interface-name*** statement.
- Configure the logical interface descriptor by including the **unit** statement within the **interfaces *interface-name*** statement.
- Configure the family descriptor by including the **family** statement within the **unit** statement.
- Configure address entries by including the **address** statement within the **family** statement.
- Configure tunnels by including the **tunnel** statement within the **unit** statement.

Interface Naming

Each interface has the following components:

- An interface name that specifies the media type
- The slot where the FPC is located
- The location of the PIC on the FPC
- The PIC port

The interface name uniquely identifies an individual network connector in the system. You use the interface name when configuring interfaces and when enabling various functions and properties, such as routing protocols, on individual interfaces. The system uses the interface name when displaying information about the interface, for example, in the **show interfaces** command.

The interface name is represented by a physical part, a logical part, and a channel part in the following format:

physical<: *channel* >.logical

The channel part of the name is optional for all interfaces except Channelized DS3, E1, OC12, and STM1. For more information about channelized interfaces, see the *Junos Network Interfaces Configuration Guide*.

Physical Part of an Interface Name

The physical part of an interface name identifies the physical device, which corresponds to a single physical network connector. This part of the interface name has the following format:

type-fpc/pic/port

type is the media type, which identifies the network device. See [Table 6 on page 6](#) for information on supported interface types.

fpc identifies the number of the FPC card on which the physical interface is located. Specifically, it is the number of the slot in which the FPC card is installed. M40, M40e, M160, M320, T320, and T640 platforms each have eight FPC slots that are numbered from 0 through 7 from left to right as you are facing the front of the chassis. The M20 routing platform has four FPC slots that are numbered from 0 through 3 from top to bottom as you are facing the front of the chassis. The slot number is printed adjacent to each slot. The M5, M7i, M10, and M10i routing platforms do not use FPCs; you install the PICs individually. The M5 and M7i routing platforms have space for up to four PICs. The M7i routing platform also comes with an integrated Tunnel PIC or an optional integrated AS PIC. The M10 and M10i routing platforms have space for up to eight PICs.

pic identifies the number of the PIC card on which the physical interface is located. Specifically, it is the number of the PIC location on the FPC. The four PIC slots are numbered from 0 through 3. The PIC location is printed on the FPC carrier board. For PICs that occupy more than one PIC location, use the lower location number.

port identifies a specific port on a PIC. The number of ports varies depending on the PIC. The port slot numbers are printed on the PIC.

Logical Part of an Interface Name

The logical unit part of the interface name corresponds to the logical unit number, which can be a number in the range from 0 through 16,384.

Separators in Interface Names

There is a separator of some type between each element of an interface name.

In the physical part of the name, a hyphen (-) separates the media type from the FPC number, and a slash (/) separates the FPC, PIC, and port numbers.

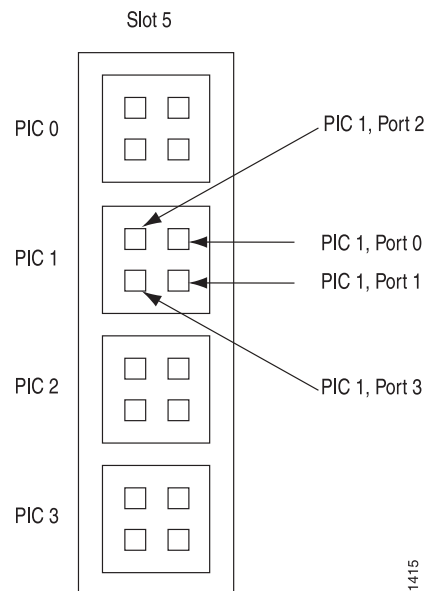
In the virtual part of the name, a period (.) separates the channel and logical unit numbers.

A colon (:) separates the physical and virtual parts of the interface name.

Examples: Interface Names

This section provides examples of naming interfaces. See [Figure 1 on page 11](#) for an example of where the slots, PICs, and ports are located on the M40 router. Examine your PIC to determine the port numbers; all port numbers are marked on the PIC.

Figure 1: Interface Slot, PIC, and Port Locations



For an FPC in slot 1 with two OC3 SONET PICs in PIC positions 0 and 1, each PIC with two ports uses the following names:

```
so-1/0/0.0
so-1/0/1.0
so-1/1/0.0
so-1/1/1.0
```

An OC48 SONET FPC in slot 1 and in concatenated mode appears as a single FPC with a single PIC, which has a single port. If this interface has a single logical unit, the name is as follows:

```
so-1/0/0.0
```

An OC48 SONET FPC in slot 1 and in channelized mode has a number for each channel. For example:

```
so-1/0/0:0
so-1/0/0:1
```

For an FPC in slot 1 with a Channelized OC12 PIC in PIC position 2, the DS3 channels have the following names:

```
t3-1/2/0:0
t3-1/2/0:1
t3-1/2/0:2
...
```

t3-1/2/0:11

For an FPC in slot 1 with four OC12 ATM PICs (the FPC is fully populated), the four PICs, each with a single port and a single logical unit, have the following names:

at-1/0/0.0
at-1/1/0.0
at-1/2/0.0
at-1/3/0.0

Channelized DS3 to DS0 Interface Naming

You can configure 28 T1 channels for each 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 Channelized DS3 to DS0 PIC might have the following physical and virtual interfaces:

DS0/0/0: x : y

where **x** is a T1 link ranging from 0 through 27, and **y** is a DS0 channel group ranging from 0 through 7. See the *Junos Network Interfaces Configuration Guide* for more information about ranges.

Channelized DS3 to DS1 Interface Naming

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

x is a channel number ranging from 0 through 27.

Channelized Intelligent Queuing Interface Naming

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



NOTE: Channelized IQ interfaces require M-series Enhanced FPCs.

Wherever the Junos documentation refers to channelized interfaces and PICs without the “intelligent queuing” or “IQ” descriptor, they are referring to the original channelized interfaces and PICs.

You can configure each port of a channelized IQ PIC as a single interface that uses the entire available bandwidth, or partition each port into smaller data channels. Following are the interface names associated with channelized IQ PICs:

- **coc12-fpc/pic/port**—On a Channelized OC12 IQ PIC
- **coc1-fpc/pic/port:channel**—On a Channelized OC12 IQ PIC

- **ct3-fpc/pic/port<:channel>**—On a Channelized OC12 IQ PIC or a Channelized DS3 IQ PIC
- **cstm1-fpc/pic/port**—On a Channelized STM1 IQ PIC
- **cau4-fpc/pic/port:channel**—On a Channelized STM1 IQ PIC
- **ct1-fpc/pic/port<:channel>**—On a Channelized OC12 IQ PIC or a Channelized DS3 IQ PIC
- **ce1-fpc/pic/port<:channel>**—On a Channelized E1 IQ PIC or a Channelized STM1 IQ PIC
- **e1-fpc/pic/port<:channel>**—E1 channels configured on a Channelized E1 IQ or a Channelized STM1 IQ PIC
- **ds-fpc/pic/port<:channel>**— *Nx* DS0 channels configured on a Channelized OC12 IQ PIC, Channelized STM1 IQ PIC, Channelized DS3 IQ PIC, or Channelized E1 IQ PIC
- **so-fpc/pic/port<:channel>**—SONET/SDH channels configure four OC3 channels on a Channelized OC12 IQ PIC, one OC12 channel on a Channelized OC12 IQ PIC, or one STM1 channel on a Channelized STM1 IQ PIC
- **t1-fpc/pic/port<:channel>**—T1 channels configured on a Channelized OC12 IQ PIC or a Channelized DS3 IQ PIC
- **t3-fpc/pic/port<:channel>**—T3 channels configured on a Channelized OC12 IQ PIC or a Channelized DS3 IQ PIC

How Interface Configurations Are Displayed

When you display a configuration, using either the **show** command in configuration mode or the **show configuration** top-level command, interfaces are listed in numerical order as follows:

- From lowest to highest slot number
- From lowest to highest PIC number
- From lowest to highest port number

Interface and Router Clock Sources

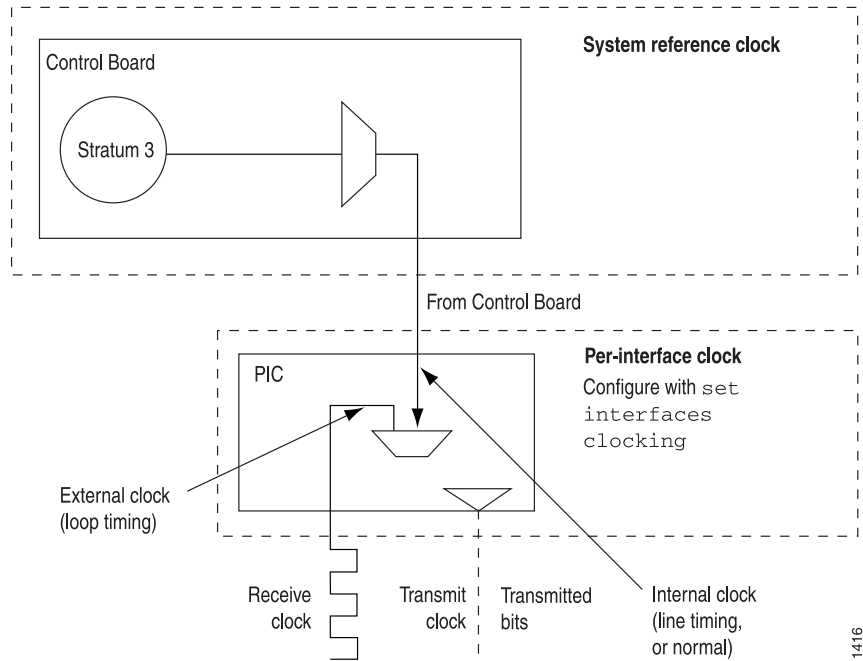
When running a loopback test on T1, T3, ATM, and SONET interfaces, you must configure the *transmit clock*. The transmit clock aligns each outgoing packet transmitted over the router's interfaces. For both the router and interfaces, the clock source can be the router's internal Stratum 3 clock, which resides on the System Control Board (SCB), the System and Switch Board (SSB), the Forwarding Engine Board (FEB), or the Miscellaneous Control Subsystem (MCS) (depending on the router model), or an external clock that is received from the interface you are configuring. For example, interface A can transmit on interface A's received clock (external, loop timing) or the Stratum 3 clock (internal, line timing). Interface A cannot use a clock from any other source.

By default, each interface uses the router's internal Stratum 3 clock. To configure the clock source of each interface, include the **clocking** statement at the **[edit interfaces interface-name]** hierarchy level:

```
[edit interfaces interface-name]
clocking (internal | external);
```

Figure 2 on page 14 illustrates the different clock sources.

Figure 2: Clock Sources



1416

CHAPTER 2

Investigate Interface Steps and Commands

This chapter describes, in a general way, the operational and configuration mode commands you use when investigating interface problems on the following interfaces:

- T1
- T3
- Asynchronous Transfer Mode (ATM) 1 and ATM 2 intelligent queuing (IQ)
- SONET
- Fast Ethernet and Gigabit Ethernet
- Channelized DS3
- Multichannel DS3
- Channelized OC12
- Channelized OC12 IQ

In operational mode, you monitor and troubleshoot the software, network connectivity, and the router by entering command-line interface (CLI) commands. For additional information about operational mode commands, see the *Junos Operational Mode Command Reference*.

In configuration mode, you configure the interfaces by entering configuration mode and creating a hierarchy of configuration statements. For additional information about configuring the router, see the *Junos System Basics Configuration Guide*.

- [Investigate Interface Steps on page 15](#)

Investigate Interface Steps

The monitor interfaces chapter helps you determine the nature of the interface problem. The loopback test chapter provides information to help you isolate the source of the problem. The locate alarms and errors chapter explains some of the alarms and errors for the media.

The investigation process for each interface is described in three chapters which cover a different aspect of the process.

1. [Monitor Interfaces on page 16](#)
2. [Perform a Loopback Test on an Interface on page 16](#)
3. [Locate Interface Alarms on page 18](#)

Monitor Interfaces

Problem 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 “*Commands Used to Monitor Interfaces*” table lists and describes the operational mode commands you use to monitor interfaces.

Table 7: Commands Used to Monitor Interfaces

CLI Command	Description
show interfaces terse <i>interface-name</i> For example: show interfaces terse t1*	Displays summary information about the named interfaces.
show interfaces <i>interface-name</i> For example: show interfaces t1-x/x/x	Displays static status information about a specific interface.
show interfaces <i>interface-name</i> extensive For example: show interfaces t1-x/x/x extensive	Displays very detailed interface information about a specific interface.
monitor interface <i>interface-name</i> For example: monitor interface t1-x/x/x	Displays real-time statistics about a physical interface, updated every second.

Perform a Loopback Test on an Interface

Problem 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. 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. 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 “*Commands Used to Perform Loopback Testing on Interfaces*” table 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).

Table 8: Commands Used to Perform Loopback Testing on Interfaces

CLI Statement or Command	Interface Type	Description
<code>[edit interfaces <i>interface-name</i> <i>interface-</i> options]</code> <code>set loopback (local remote)</code>	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.
<code>show</code>	All interfaces	Verify the configuration before you commit it.
<code>commit</code>	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.
<code>[edit interfaces <i>interface-name</i>]</code> <code>set clocking internal</code>	T1, T3, ATM, and SONET interfaces	The clocking statement at this hierarchy level configures the clock source of the interface to internal.

Table 8: Commands Used to Perform Loopback Testing on Interfaces (*continued*)

CLI Statement or Command	Interface Type	Description
<code>show interfaces <i>interface-name</i></code>	Used for all interfaces	Display static status information about a specific interface.
<code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet <i>address address</i>] arp <i>ip-address</i> mac <i>mac-address</i></code>	Fast Ethernet and Gigabit Ethernet interfaces	The arp statement at this hierarchy level defines mappings between IP and Media Access Control (MAC) addresses.
<code>show arp no-resolve</code>	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).
<code>clear interfaces statistics <i>interface-name</i></code>	All interfaces	Reset the statistics for an interface to zero.
<code>[edit interfaces <i>interface-name</i>] set encapsulation cisco-hdlc</code>	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.
<code>[edit interfaces <i>interface-name</i>] set no-keepalives</code>	T1, T3, SONET, and Multichannel DS3 interfaces	The no-keepalives statement at this level disables the sending of keepalives on the physical interface.
<code>show interfaces <i>interface-name</i> terse</code>	T1, T3, and SONET interfaces	Display summary information about interfaces. (Use to display the status of the logical interfaces for these interfaces.)
<code>ping interface t1- <i>x/x/x</i> local-IP-address bypass-routing count 1000 rapid</code>	All interfaces	<p>Check the reachability of network hosts by sending ICMP ECHO_REQUEST messages to elicit ICMP ECHO_RESPONSE messages from the specified host.</p> <p>Use the bypass-routing option to ping a local system through an interface that has no route through it.</p> <p>The count option sends 1000 ping requests through the system.</p> <p>Type Ctrl+C to interrupt a ping command.</p>
<code>show interfaces <i>interface-name</i> extensive</code>	All interfaces	Display very detailed interface information about a specific interface.

Locate Interface Alarms

Problem 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.

PART 2

Investigate T1 Interfaces

- [Monitor T1 Interfaces on page 23](#)
- [Use Loopback Testing for T1 Interfaces on page 29](#)
- [Locate T1 Alarms and Errors on page 41](#)

CHAPTER 3

Monitor T1 Interfaces

This chapter describes how to monitor T1 interfaces and begin the process of isolating T1 interface problems when they occur.

- [Checklist for Monitoring T1 Interfaces on page 23](#)
- [Monitor T1 Interfaces on page 23](#)

Checklist for Monitoring T1 Interfaces

Purpose To monitor T1 interfaces and beginning the process of isolating T1 interface problems when they occur.

Action [Table 9 on page 23](#) provides the links and commands for monitoring T1 interfaces.

Table 9: Checklist for Monitoring T1 Interfaces

Tasks	Command or Action
“Monitor T1 Interfaces” on page 23	
1. Display the Status of T1 Interfaces on page 24	<code>show interfaces terse t1*</code>
2. Display the Status of a Specific T1 Interface on page 25	<code>show interfaces t1-fpc/pic/port</code>
3. Display Extensive Status Information for a Specific T1 Interface on page 25	<code>show interfaces t1-fpc/pic/port extensive</code>
4. Monitor Statistics for a T1 Interface on page 26	<code>monitor interface t1-fpc/pic/port</code>

Monitor T1 Interfaces

By monitoring T1 interfaces, you begin the process of isolating T1 interface problems when they occur.

To monitor your T1 interfaces, follow these steps:

1. [Display the Status of T1 Interfaces on page 24](#)
2. [Display the Status of a Specific T1 Interface on page 25](#)

3. [Display Extensive Status Information for a Specific T1 Interface on page 25](#)
4. [Monitor Statistics for a T1 Interface on page 26](#)

Display the Status of T1 Interfaces

Purpose To display the status of T1 interfaces.

Action Use the following Junos OS command-line interface (CLI) operational mode command to display the status of T1 interfaces:

```
user@host> show interfaces terse t1*
```

Sample Output

```
user@host> show interfaces terse t1*
Interface      Admin Link Proto Local Remote
t1-1/0/0       down up --- administratively disabled
t1-1/0/0.0     up   down inet 1.1.1.1/30
t1-1/0/1       up   down --- physical layer down
t1-1/0/1.0     up   down inet 2.2.2.2/30 --- link layer down
t1-1/0/2       up   up
t1-1/0/2.0     up   up  inet 3.3.3.3/30 --- link layer up
t1-1/0/3       up   down
```

Meaning This sample output shows the status of both the physical and logical interfaces. See [Table 10 on page 24](#) for a description of what the output means.

Table 10: Status of T1 Interfaces

Physical Interface	Logical Interface	Status Description
t1-1/0/0	t1-1/0/0.0	This interface is administratively disabled and the physical link is healthy (Link Up), but the logical interface is not established. The logical interface is administratively enabled (Admin Up), but is down because the physical link is disabled.
Admin Down	Admin Up	
Link Up	Link Down	
t1-1/0/1	t1-1/0/1.0	This interface is not functioning between the local router and the remote router because both the physical and logical links are down (Link Down). The interface is not administratively disabled because both the physical and logical links are up (Admin Up).
Admin Up	Admin Up	
Link Down	Link Down	
t1-1/0/2	t1-1/0/2.0	This interface has both the physical and logical links up and running.
Admin Up	Admin Up	
Link Up	Link Up	
t1-1/0/3		The physical interfaces is added to the configuration, but the logical link is not configured.
Admin Up		
Link Down		

Display the Status of a Specific T1 Interface

Purpose To display the status of a specific T1 interface when you need to investigate its status further.

Action To display the status of a specific T1 interface, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces t1-fpc/pic/port
```

Sample Output

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Down
  Interface index: 24, SNMP ifIndex: 20
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
  FCS: 16, Framing: ESF
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Last flapped   : 2002-01-01 00:00:35 UTC (00:00:59 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DSI alarms    : LOF, LOS
  DSI defects    : LOF, LOS
```

Meaning The first line of the sample output shows the status of the link. In this example, the first line shows that the physical link is down. If the first 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. Also, the output shows loss of frame (LOF) and loss of signal (LOS) alarms active. Any active alarm or defect can cause the interface to be down.

Display Extensive Status Information for a Specific T1 Interface

Purpose To display extensive status information about a specific T1 interface.

Action To display extensive status information about a specific T1 interface, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces t1-fpc/pic/port extensive
```

Sample Output

```
user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Down
  Interface index: 24, SNMP ifIndex: 20, Generation: 27
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
  FCS: 16, Framing: ESF
  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
  Last flapped   : 2002-01-01 00:00:35 UTC (00:01:00 ago)
  Statistics last cleared: 2002-01-01 00:01:03 UTC (00:00:32 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, 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 :LOF,LOS
DS1 defects : LOF, LOS
T1 media:
  Seconds      Count  State
SEF            32      0 Defect Active
BEE            0      0 OK
AIS            0      0 OK
LOF            32      0 Defect Active
LOS            32      0 Defect Active
YELLOW         0      0 OK
BPV            0      0
EXZ            0      0
LCV            0      0
PCV            32    10667
CS             0      0
LES            0
ES             32
SES            32
SEFS           32
BES            0
UAS            32
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 3
  Timeslots      : All active
  Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
  Buildout       : 0 to 132 feet
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: Unknown (0)
Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 1 (0x00)
  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

```

Meaning The sample output shows where the errors might be occurring. Look at the active alarms and active defects for the T1 interface and investigate the T1 media accordingly. See [“Checklist for T1 Alarms and Errors” on page 41](#) for an explanation of T1 alarms.

Monitor Statistics for a T1 Interface

Purpose To monitor statistics for a T1 interface.

Action To monitor statistics for a T1 interface, use the following Junos OS CLI operational mode command:

```
user@host> monitor interface t1-fpc/pic/port
```



```

Sample Output user@host> monitor interface t1-1/0/0
Seconds: 2                               Time: 00:04:49    Delay: 0/0/1
Interface: t1-1/1/0, Enabled, Link is Down
Encapsulation: PPP, Keepalives, Speed: T1
Traffic statistics:                       Current delta
  Input bytes:                            0 (0 bps)          [0]
  Output bytes:                           0 (0 bps)          [0]
  Input packets:                          0 (0 pps)          [0]
  Output packets:                         0 (0 pps)          [0]
Error statistics:
  Input errors:                           0                  [0]
  Input drops:                            0                  [0]
  Input framing errors:                    0                  [0]
  Policed discards:                       0                  [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:                           0                  [0]
Active alarms : LOF LOS
Active defects: LOF LOS
T1 statistics:
  BPV                                     0                  [0]
  EXZ                                     0                  [0]
  LCV                                     0                  [0]
  PCV                                    40335                [332]
  CS                                      0                  [0]
Interface warnings:
  o Outstanding DS1 alarm(s)
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'

```

Meaning The sample output shows that the T1 interface is enabled but the link is down. The **bps** value is in bytes per second and not bits per second. To calculate bits per second, multiply the **bps** value by 8.

The **monitor** command checks for and displays common interface failures, indicates whether loopback is detected, and shows any increases in framing errors. Use information from this command to help to 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.

Table 11 on page 27 lists additional problem situations and actions to help you further diagnose a problem.

Table 11: Problem Situations and Actions

Problem Situation	Action
Framing errors are increasing.	Check the frame checksum sequence (FCS), scrambling, and subrate configuration.

Table 11: Problem Situations and Actions *(continued)*

Problem Situation	Action
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.

.....

CHAPTER 4

Use Loopback Testing for T1 Interfaces

This chapter describes using loopback testing to isolate T1 interface problems.

- [Checklist for Using Loopback Testing for T1 Interfaces on page 29](#)
- [Diagnose a Suspected Hardware Problem with a T1 Interface on page 30](#)
- [Create a Loopback on page 31](#)
- [Set Clocking to Internal on page 32](#)
- [Verify That the T1 Interface Is Up on page 33](#)
- [Clear T1 Interface Statistics on page 34](#)
- [Force the Link Layer To Stay Up on page 34](#)
- [Verify the Status of the Logical Interface on page 36](#)
- [Ping the T1 Interface on page 37](#)
- [Check for T1 Interface Error Statistics on page 37](#)
- [Diagnose a Suspected Circuit Problem on page 39](#)

Checklist for Using Loopback Testing for T1 Interfaces

Purpose To use loopback testing for T1 interfaces.

Action [Table 12 on page 29](#) provides commands for using loopback testing for T1 interfaces.

Table 12: Checklist for Using Loopback Testing for T1 Interfaces

Tasks	Command or Action
“Diagnose a Suspected Hardware Problem with a T1 Interface” on page 30	
1. Create a Loopback on page 31	
a. Create a Physical Loopback on page 31	Connect a T1 loopback plug.
b. Configure a Local Loopback on page 31	<pre>[edit interfaces <i>interface-name</i> t1-options] set loopback local show commit</pre>

Table 12: Checklist for Using Loopback Testing for T1 Interfaces (*continued*)

Tasks	Command or Action
2. Set Clocking to Internal on page 32	<code>[edit interfaces <i>interface-name</i>] set clocking internal show commit</code>
3. Verify That the T1 Interface Is Up on page 33	<code>show interfaces t1-fpc/pic/port</code>
4. Clear T1 Interface Statistics on page 34	<code>clear interfaces statistics t1-fpc/pic/port</code>
5. Force the Link Layer To Stay Up on page 34	
a. Configure Encapsulation to Cisco-HDLC on page 34	<code>[edit interfaces <i>interface-name</i>] set encapsulation cisco-hdlc show commit</code>
b. Configure No-Keepalives on page 35	<code>[edit interfaces <i>interface-name</i>] set no-keepalives show commit</code>
6. Verify the Status of the Logical Interface on page 36	<code>show interfaces t1-fpc/pic/port show interfaces t1-fpc/pic/port terse</code>
7. Ping the T1 Interface on page 37	<code>ping interface t1-fpc/pic/port local-IP-address bypass-routing count 1000 rapid</code>
8. Check for T1 Interface Error Statistics on page 37	<code>show interfaces t1-fpc/pic/port extensive</code>
“Diagnose a Suspected Circuit Problem” on page 39	
1. Create a Loop from the Router to the Network on page 39	<code>[edit interfaces <i>interface-name</i> t1-options] set loopback remote show commit</code>
2. Create a Loop to the Router from Various Points in the Network on page 40	Perform Steps 2 through 8 from “Diagnose a Suspected Hardware Problem with a T1 Interface” on page 30.

Diagnose a Suspected Hardware Problem with a T1 Interface

Problem Take the following steps to verify if there is a hardware problem with a T1 interface.

Solution To diagnose a suspected hardware problem with a T1 interface, follow these steps:

1. [Create a Loopback on page 31](#)
2. [Set Clocking to Internal on page 32](#)

3. [Verify That the T1 Interface Is Up on page 33](#)
4. [Clear T1 Interface Statistics on page 34](#)
5. [Force the Link Layer To Stay Up on page 34](#)
6. [Verify the Status of the Logical Interface on page 36](#)
7. [Ping the T1 Interface on page 37](#)
8. [Check for T1 Interface Error Statistics on page 37](#)

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 T1 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 31](#)
2. [Configure a Local Loopback on page 31](#)

Create a Physical Loopback

Action To create a physical loopback at the T1 port, connect a T1 loopback plug to the T1 port. You can make a T1 loopback plug by connecting pin 1 to pin 4 and pin 2 to pin 5 on an RJ-48 plug.

Meaning When you create and test a physical loopback, you are testing the T1 port. 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 without physically connecting the transmit port to the receive port, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces interface-name t1-options
```

2. Configure the loopback:

```
[edit interfaces interface-name t1-options]
user@host# set loopback local
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t1-1/3/0 t1-options]
user@host# show
```

```
loopback local;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t1-1/3/0 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.

Set Clocking to Internal

Purpose You set clocking to internal because there is no external clock source in a loopback connection.

Action To configure clocking to internal, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces interface-name
```

2. Configure the clocking to internal:

```
[edit interfaces interface-name]
user@host# set clocking internal
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t1-1/3/0]
user@host# show
clocking internal;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t1-1/3/0]
user@host# commit
commit complete
```

Meaning This command saves the clocking change to the configuration database, activates the configuration on the router, and exits configuration mode.

Verify That the T1 Interface Is Up

Purpose Display the status of the T1 interface to determine whether the physical link is up or down.

Action To verify that the status of the T1 interface is up, use the following Junos OS command-line interface (CLI) operational mode command:

```
user@host> show interfaces t1-fpc/pic/port
```

Sample Output The following output is for a T1 interface with the physical link up:

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 24, SNMP ifIndex: 20
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
  None, FCS: 16, Framing: ESF
  Device flags   : Present Running Loop-Detected
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 3 (00:00:06 ago), Output: 9 (00:00:06 ago)
  Last flapped   : 2002-01-06 00:59:00 UTC (00:00:40 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1 alarms    : None
  DS1 defects   : None
  Logical interface t1-1/1/0.0 (Index 9) (SNMP ifIndex 34)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 1.1.1.0/30, Local: 1.1.1.1
```

Meaning The sample output shows that the physical link is up, the loop is detected, and there are no T1 alarms or defects.

Sample Output If the physical link is down, there may be a problem with the port. The following output is an example of the **show interfaces t1-fpc/pic/port** command when the physical link is down:

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Down
  Interface index: 24, SNMP ifIndex: 20
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
  None, FCS: 16, Framing: ESF
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 32 (00:00:23 ago), Output: 35 (00:00:04 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1 alarms     : LOF, LOS
  DS1 defects    : LOF, LOS
  Logical interface t1-0/0/0.0 (Index 9) (SNMP ifIndex 34)
```

```
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 1500, Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 1.1.1.0/30, Local: 1.1.1.1
```

Meaning The sample output shows that the physical link is down, the device flags and interface flags are down, and that there are T1 alarms and defects. Verify that the fiber can successfully loop a known good port of the same type by checking for damage to the cable.

Clear T1 Interface Statistics

Purpose You must reset T1 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 diagnostics.

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
```

Sample Output

```
user@host> clear interfaces statistics t1-1/1/0
user@host>
```

Meaning This command clears the interface statistics counters for interface **t1-1/1/0** only.

Force the Link Layer To Stay Up

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.

To force the link layer to stay up, follow these steps:

1. [Configure Encapsulation to Cisco-HDLC on page 34](#)
2. [Configure No-Keepalives on page 35](#)

Configure Encapsulation to Cisco-HDLC

Action To configure 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 encapsulation to Cisco-HDLC:

```
[edit interfaces interface-name]
user@host# set encapsulation cisco-hdlc
```

3. Verify the configuration:


```
user@host# show
```

For example:

```
[edit interfaces t1-1/3/0]
user@host# show
encapsulation hdlc;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t1-1/3/0]
user@host# commit
commit complete
```

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 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 no-keepalives:

```
[edit interfaces interface-name]
user@host# set no-keepalives
```

For example:

```
[edit interfaces t1-1/3/0]
user@host# set no-keepalives
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t1-1/3/0]
user@host# show
no-keepalives;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t1-1/3/0]
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 two Junos OS CLI operational mode commands:

Action `user@host> show interfaces t1-fpc/pic/port`
`user@host> show interfaces t1-fpc/pic/port terse`

Sample Output The following output is for a logical interface that is up:

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 29, SNMP ifIndex: 20
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
  None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : No-Keepalives
  Last flapped   : 2002-01-06 01:09:00 UTC (00:00:44 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1 alarms    : None
  DS1 defects    : None
  Logical interface t1-1/1/0.0 (Index 9) (SNMP ifIndex 34)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Bandwidth: 0
    Protocol inet, MTU: 1500, Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 1.1.1.0/30, Local: 1.1.1.1

user@host> show interfaces terse t1-1/1/0
Interface      Admin Link Proto Local                                Remote
t1-1/1/0       up    up
t1-1/1/0.0     up    up  inet  1.1.1.1/30
```

Meaning The sample output for the first command shows that the logical link is up because there are no flags indicating that the link layer is down. The output for the **show interfaces terse** command shows that logical interface **t1-1/0/0** is up.

Sample Output The following output is for a logical interface that is down:

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 29, SNMP ifIndex: 20
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
  None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 14 (00:01:01 ago), Output: 9 (00:00:05 ago)
  Last flapped   : 2002-01-06 01:09:00 UTC (00:03:39 ago)
  Input rate     : 0 bps (0 pps)
```

```
user@host> show interfaces terse t1-1/1/0
Interface      Admin Link Proto Local                                Remote
t1-1/1/0       up    down
t1-1/1/0.0     up    down inet  1.1.1.1/30
```

Ping the T1 Interface

Check for T1 Interface Error Statistics

```
user@host> show interfaces t1-fpc/pic/port extensive
```

Sample Output

```
user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Up
Interface index: 29, SNMP ifIndex: 20, Generation: 32
Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
None, FCS: 16, 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 : 28 (last seen 00:00:02 ago)
  Output: 32 (last sent 00:00:06 ago)
Last flapped : 2002-01-06 01:09:00 UTC (00:07:19 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes : 84682 80 bps
  Output bytes : 92685 0 bps
  Input packets: 1031 0 pps
  Output packets: 1077 0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 70, 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
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 2 OK
  BPV 1 1
  EXZ 1 1
  LCV 1 2
  PCV 1 6
  CS 0 0
  LES 1
  ES 1
  SES 1
  SEFS 1
  BES 1
  UAS 0
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1514, Runt threshold: 3
  Timeslots : All active
  Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
  Buildout : 0 to 132 feet
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: Unknown (0)
Packet Forwarding Engine configuration:
  Destination slot: 1, PLP byte: 1 (0x00)
  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 t1-1/1/0.0 (Index 9) (SNMP ifIndex 34) (Generation 14)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Bandwidth: 0
Protocol inet, MTU: 1500, Flags: None, Generation: 29 Route table: 0
Addresses, Flags: Is-Preferred Is-Primary
Destination: 1.1.1.0/30, Local: 1.1.1.1, Broadcast: Unspecified,
Generation: 36

```

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

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. [Create a Loop from the Router to the Network on page 39](#)
2. [Create a Loop to the Router from Various Points in the Network on page 40](#)

Create a Loop from the Router to the Network

Purpose Creating a loop from the router to the network allows the transport-layer engineer to test the router from various points in the network. This helps the engineer isolate where the problem is located.

Action To create a loop from the router to the network, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```

[edit]
user@host# edit interfaces interface-name t1-options

```

2. Configure remote loopback:

```

[edit interfaces interface-name t1-options]
user@host# set loopback remote

```

3. Verify the configuration:

```

user@host# show

```

For example:

```

[edit interfaces t1-1/3/0 t1-options]
user@host# show

```

```
loopback remote;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t1-1/3/0 t1-options]
user@host# commit
commit complete
```

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 Step 2 through Step 8 in [“Diagnose a Suspected Hardware Problem with a T1 Interface” on page 30](#). 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.

CHAPTER 5

Locate T1 Alarms and Errors

This chapter describes the most common T1 alarms and errors encountered when investigating line problems on a Juniper Networks router.

- [Checklist for T1 Alarms and Errors on page 41](#)
- [Display T1 Alarms and Errors on page 41](#)
- [Locate Most Common T1 Alarms and Errors on page 44](#)

Checklist for T1 Alarms and Errors

Purpose To check T1 alarms and errors.

Action [Table 13 on page 41](#) provides the links and commands for checking T1 alarms and errors.

Table 13: Checklist for T1 Alarms and Errors

Tasks	Command or Action
“Display T1 Alarms and Errors” on page 41	<code>show interfaces t1-fpc/pic/port extensive</code>
“Locate Most Common T1 Alarms and Errors” on page 44	
1. Locate Loss of Signal and Loss of Frame Alarms on page 44	Check the connection between the router port and the first T1 network element.
2. Locate Alarm Indication Signal Alarms on page 45	Check the T1 network element connected to the T1 interface.
3. Locate an Incoming Yellow Alarm on page 45	Check the cable between the T1 interface and the directly connected T1 network element.

Display T1 Alarms and Errors

Purpose To display T1 alarms and errors, use the following Junos OS command-line interface (CLI) operational mode command:

Action `user@host> show interfaces t1-fpc/pic/port extensive`

Sample Output `user@host> show interfaces t1-1/1/0 extensive`

```

Physical interface: t1-1/1/0, Enabled, Physical link is Down
  Interface index: 24, SNMP ifIndex: 20, Generation: 27
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
  FCS: 16, Framing: ESF
  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
  Last flapped  : 2002-01-01 00:00:35 UTC (00:01:00 ago)
  Statistics last cleared: 2002-01-01 00:01:03 UTC (00:00:32 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, Policed discards: 0, L3 incompletes:
    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 : LOF, LOS
  DS1 defects : LOF, LOS
  T1 media:
    Seconds Count State
    SEF 32 0 Defect Active
    BEE 0 0 OK
    AIS 0 0 OK
    LOF 32 0 Defect Active
    LOS 32 0 Defect Active
    YELLOW 0 0 OK
    BPV 0 0
    EXZ 0 0
    LCV 0 0
    PCV 32 10667
    CS 0 0
    LES 0
    ES 32
    SES 32
    SEFS 32
    BES 0
    UAS 32
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 1514, Runt threshold: 3
    Timeslots : All active
    Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
    Buildout : 0 to 132 feet
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: Unknown (0)
  Packet Forwarding Engine configuration:
    Destination slot: 1, PLP byte: 1 (0x00)
    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

```


Meaning The sample output shows 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 14 on page 43](#) lists the T1 media-specific alarms or defects that can render the interface unable to pass packets.

Table 14: T1 Interface Alarms and Error Definitions

T1 Alarm or Error	Definitions
SEF	Severely errored frame
BEE	Block error event
AIS	Alarm indication signal (blue alarm)
LOF	Loss of frame
LOS	Loss of signal
YLW	Yellow alarm
BPV	Bipolar violation
EXZ	Excessive zeros
LCV	Line code violation
PCV	Path code violation
CS	Controlled slip
LES	Line errored seconds
ES	Errored seconds
SES	Severely errored seconds
SEFS	Severely errored frame seconds
BES	Bursty errored seconds

Table 14: T1 Interface Alarms and Error Definitions (*continued*)

T1 Alarm or Error	Definitions
UAS	Unavailable seconds

Locate Most Common T1 Alarms and Errors

To locate common alarms and errors, follow these steps:

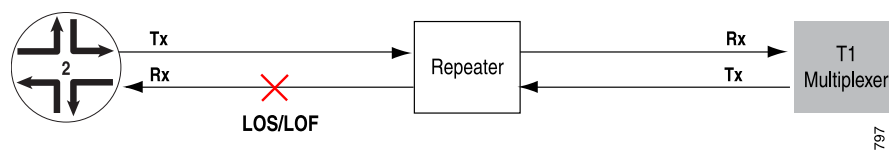
1. [Locate Loss of Signal and Loss of Frame Alarms on page 44](#)
2. [Locate Alarm Indication Signal Alarms on page 45](#)
3. [Locate an Incoming Yellow Alarm on page 45](#)

Locate Loss of Signal and Loss of Frame Alarms

Problem A loss of signal (LOS) or loss of frame (LOF) alarm indicates that a signal could not be detected at the T1 interface.

Solution To locate the LOS or LOF alarm, check the connection between the router port and the first T1 network element. In the example network in [Figure 3 on page 44](#), the X indicates that there is a connection problem between Router2 and the nearest T1 network element.

Figure 3: Location of an LOS or LOF Alarm in a T1 Network



NOTE: Tx represents the transmit port and Rx represents the receive port.

Sample Output

```

user@router2> show interfaces t1-1/1/1 extensive
[... Output truncated...]
DS1  alarms   : LOF, LOS
DS1  defects  : LOF, LOS
T1  media :
Seconds      Count  State
SEF          32      0 Defect Active
BEE          0       0 OK
AIS          0       0 OK
LOF          32      0 Defect Active
LOS          32      0 Defect Active
YELLOW       0       0 OK
BPV          0       0
EXZ          0       0
LCV          0       0
PCV          32     10667
CS           0       0
LES          0       0

```

ES	32
SES	32
SEFS	32
BES	0
UAS	32

[...Output truncated...]

Meaning The sample output shows that Router 2 (Rx) detected a cumulative LOS and LOF alarm for 32 seconds.

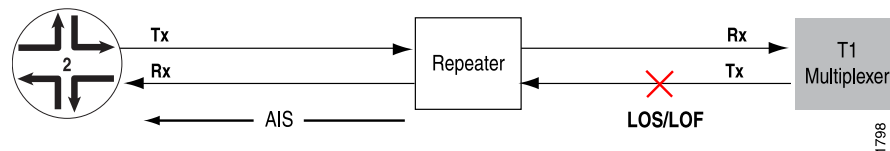
Locate Alarm Indication Signal Alarms

Problem An alarm indication signal (AIS) is a valid framed signal with payload containing a repeating 1010 pattern. An AIS alarm indicates a problem with the line upstream from the T1 network element connected to the T1 interface.

Solution To locate the AIS alarm, have the carrier check the T1 network element connected to the T1 interface and trace the problem.

All diagnostics are from the perspective of Router 2 (the Juniper Networks router). [Figure 4 on page 45](#) illustrates the location of an AIS alarm in a T1 network.

Figure 4: Location of an AIS Alarm in a T1 Network



Meaning In [Figure 4 on page 45](#), the X indicates that there is an LOS or LOF alarm between the repeater and the Tx T1 multiplexer. An AIS alarm is sent from the repeater to Router 2.

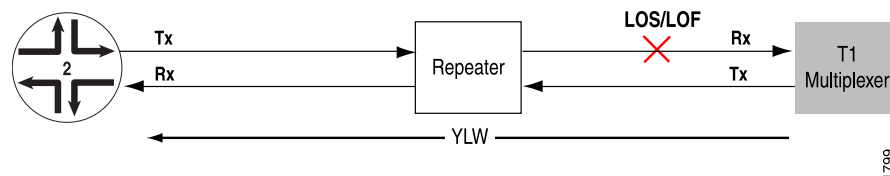
Locate an Incoming Yellow Alarm

Problem An incoming yellow alarm indicates that the T1 network element connected to the T1 interface has a problem with the signal it is receiving from the T1 interface.

Solution To locate the yellow alarm, check the cable between the T1 interface and the directly connected T1 network element.

All diagnostics are from the perspective of Router 2. [Figure 5 on page 45](#) illustrates the location of a yellow alarm in a T1 network.

Figure 5: Location of a Yellow Alarm in a T1 Network



Meaning In [Figure 5 on page 45](#), the T1 multiplexer detects an LOS or LOF alarm on its connection from Router 2 and sends a yellow (YLW) alarm to Router 2.

PART 3

Investigate T3 Interfaces

- [Monitor T3 Interfaces on page 49](#)
- [Use Loopback Testing for T3 Interfaces on page 55](#)
- [Locate T3 Alarms and Errors on page 67](#)

CHAPTER 6

Monitor T3 Interfaces

This chapter describes how to monitor T3 interfaces and begin the process of isolating T3 interface problems when they occur.

- [Checklist for Monitoring T3 Interfaces on page 49](#)
- [Monitor T3 Interfaces on page 49](#)

Checklist for Monitoring T3 Interfaces

Purpose To monitor T3 interfaces and begin the process of isolating T3 interface problems when they occur.

Action [Table 15 on page 49](#) provides the links and commands for monitoring T3 interfaces.

Table 15: Checklist for Monitoring T3 Interfaces

Tasks	Command or Action
“Monitor T3 Interfaces” on page 49	
1. Display the Status of T3 Interfaces on page 50	<code>show interfaces terse t3*</code>
2. Display the Status of a Specific T3 Interface on page 50	<code>show interfaces t3-<i>fpc/pic/port</i></code>
3. Display Extensive Status Information for a Specific T3 Interface on page 51	<code>show interfaces t3-<i>fpc/pic/port</i> extensive</code>
4. Monitor Statistics for a T3 Interface on page 52	<code>monitor interface t3-<i>fpc/pic/port</i></code>

Monitor T3 Interfaces

By monitoring T3 interfaces, you begin the process of isolating T3 interface problems when they occur.

To monitor T3 interfaces, follow these steps:

1. [Display the Status of T3 Interfaces on page 50](#)
2. [Display the Status of a Specific T3 Interface on page 50](#)

3. [Display Extensive Status Information for a Specific T3 Interface on page 51](#)
4. [Monitor Statistics for a T3 Interface on page 52](#)

Display the Status of T3 Interfaces

Purpose To display the status of T3 interfaces, use the following Junos OS command-line interface (CLI) operational mode command:

Action `user@host> show interfaces terse t3*`

Sample Output

```

user@host> show interfaces terse t3*
Interface      Admin Link Proto Local Remote
t3-1/0/0       down up    -    administratively disabled
t3-1/0/0.0     up   down inet  1.1.1.1/30
t3-1/0/1       up   down
t3-1/0/1.0     up   down inet  2.2.2.2/30 - link layer down
t3-1/0/2       up   up
t3-1/0/2.0     up   up   inet  3.3.3.3/30 - link layer up
t3-1/0/3       up   down

```

Meaning The sample output shows the status of both the physical and logical interfaces. See [Table 16 on page 50](#) for a description of what the output means.

Table 16: Status of T3 Interfaces

Physical Interface	Logical Interface	Status Description
t3-1/0/0 Admin Down Link Up	t3-1/0/0.0 Admin Up Link Down	This interface is administratively disabled and the physical link is healthy (Link Up), but the logical interface is not established. The logical interface is down because the physical link is disabled (Link Down).
t3-1/0/1 Admin Up Link Down	t3-1/0/1.0 Admin Up Link Down	This interface is not functioning between the local router and the remote router because both the physical and logical links are down (Link Down). The interface is not administratively disabled because both the physical and logical links are up (Admin Up).
t3-1/0/2 Admin Up Link Up	t3-1/0/2.0 Admin Up Link Up	This interface has both the physical and logical links up and running.
t3-1/0/3 Admin Up Link Down		This interface does not have a logical link configured.

Display the Status of a Specific T3 Interface

Purpose To display the status of a specific T3 interface when you need to investigate its status further, use the following Junos OS CLI operational mode command:

Action user@host> show interfaces t3-fpc/pic/port

Sample Output user@host> show interfaces t3-1/0/0
 Physical interface: t3-1/0/0, Enabled, Physical link is Down
 Interface index: 9, SNMP ifIndex: 10
 Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal
 Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
 Device flags : Present Running Down
 Interface flags: Hardware-Down Link-Layer-Down Point-To-Point SNMP-Traps
 Link flags : Keepalives
 Keepalive Input: 116 (00:02:32 ago), Output: 185 (00:00:02 ago)
 Input rate : 0 bps (0 pps), Output rate: 0 bps (0 pps)
 Active alarms : LOF, LOS
 Active defects : LOF, LOS
 Logical interface t3-1/0/0.0 (Index 12) (SNMP ifIndex 32)
 Flags: Device-down Point-To-Point SNMP-Traps, Encapsulation: Cisco-HDLC
 Protocol inet, MTU: 4470
 Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
 Destination: 1.1.1.0/30, Local: 1.1.1.1

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 T3 interface, use the following Junos OS CLI operational mode command:

Action user@host> show interfaces t3-fpc/pic/port extensive

Sample Output user@router> show interfaces t3-1/0/0 extensive
 Physical interface: t3-1/0/0, Enabled, Physical link is Down
 Interface index: 9, SNMP ifIndex: 10
 Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal
 Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
 Device flags : Present Running Down
 Interface flags: Hardware-Down Link-Layer-Down Point-To-Point SNMP-Traps
 Link flags : Keepalives
 Keepalive statistics:
 Input : 116 (last seen 00:02:59 ago)
 Output: 187 (last seen 00:00:09 ago)
 Statistics last cleared: Never
 Traffic statistics:
 Input bytes : 2552 0 bps
 Output bytes : 3703 0 bps
 Input packets: 116 0 pps
 Output packets: 161 0 pps
 Input errors: - Input errors
 Errors: 0, Drops: 0, Framing errors: 229, Policed discards: 1
 L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0
 SRAM errors: 0, HS link CRC errors: 0
 Output errors: - Output errors
 Carrier transitions: 4, Errors: 0, Drops: 0, Aged packets: 0
 Active alarms : LOF, LOS - DS3 active alarms and defects
 Active defects : LOF, LOS
 DS3 Media: Seconds Count State - T3 media-specific errors
 PLL Lock 0 0 OK
 Reframing 273 2 Defect Active

```

AIS                0                0 OK
LOF                273              2 Defect Active
LOS                273              2 Defect Active
IDLE               0                0 OK
YELLOW             0                0 OK
BPV                0                0
EXZ                0                0
LCV                275              18022125
PCV                0                0
CCV                0                0
LES                275
PES                273
PSES               273
CES                273
CSES               273
SEFS               273
UAS                277
HDL 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
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^3 - 1, Pseudorandom (1), Error rate: 10e-0
PFE configuration:
  Destination slot: 1, Stream number: 0, PLP byte: 1 (0x00)
  COS transmit queue bandwidth:
    Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
  COS weighted round robin:
    Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
Logical interface t3-1/0/0.0 (Index 12) (SNMP ifIndex 32)
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: 1.1.1.0/30, Local: 1.1.1.1, Broadcast: Unspecified

```

Meaning The sample output shows where the errors might be occurring. Look at the active alarms and active defects for the T3 interface and investigate the T3 media accordingly. See [“Checklist of Common T3 Alarms and Errors” on page 67](#) for an explanation of T3 alarms.

Monitor Statistics for a T3 Interface

Purpose To monitor statistics for a T3 interface, use the following Junos OS CLI operational mode command:

Action `user@host> monitor interface t3-fpc/pic/port`

Sample Output

```

user@host> monitor interface t3-1/0/0
router                Seconds: 78                Time: 21:44:15
Interface: t3-1/0/0, Enabled, Link is Down
Encapsulation: Cisco-HDLC, Keepalives, Speed: T3
Traffic statistics:
  Input bytes:         0 (0 bps)                    [0]
  Output bytes:        207 (184 bps)                 [184]
  Input packets:       0 (0 pps)                    [0]
  Output packets:      9 (1 pps)                    [8]
Encapsulation statistics:

```

```

Input keepalives:      0                      [0]
Output keepalives:    9                      [8]
Error statistics:
Input errors:         0                      [0]
Input drops:         0                      [0]
Input framing errors: 9                      [8]
CCV                   0                      [0]
Interface warnings:
  o Received keepalive count is zero
  o Framing errors, check FCS, scrambling and subrate configuration
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 reports any increases in framing errors. Use the information from this command to 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.

Table 17 on page 53 presents problem situations and actions to help you further understand the problem.

Table 17: Problem Situations and Actions

Problem Situation	Action
Framing errors are increasing.	Check the frame check 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 troubleshooting purposes. Do not leave it on during normal router operations because real-time monitoring of traffic consumes additional CPU and memory resources.

CHAPTER 7

Use Loopback Testing for T3 Interfaces

This chapter describes using loopback testing to isolate T3 interface problems.

- [Checklist for Using Loopback Testing for T3 Interfaces on page 55](#)
- [Diagnose a Suspected Hardware Problem with a T3 Interface on page 56](#)
- [Create a Loopback on page 57](#)
- [Set Clocking to Internal on page 58](#)
- [Verify That the T3 Interface Is Up on page 59](#)
- [Clear T3 Interface Statistics on page 60](#)
- [Force the Link Layer To Stay Up on page 60](#)
- [Verify the Status of the Logical Interface on page 62](#)
- [Ping the T3 Interface on page 63](#)
- [Check for T3 Interface Error Statistics on page 63](#)
- [Diagnose a Suspected Circuit Problem on page 65](#)

Checklist for Using Loopback Testing for T3 Interfaces

Purpose To use loopback testing to isolate T3 interface problems.

Action [Table 18 on page 55](#) provides links and commands for using loopback testing for T3 interfaces.

Table 18: Checklist for Using Loopback Testing for T3 Interfaces

"Diagnose a Suspected Hardware Problem with a T3 Interface" on page 56	Command or Action
1. Create a Loopback on page 57	
a. Create a Physical Loopback on page 57	Connect the transmit port to the receive port.
b. Configure a Local Loopback on page 57	<pre>[edit interfaces <i>interface-name</i> t3-options] set loopback local show commit</pre>

Table 18: Checklist for Using Loopback Testing for T3 Interfaces (*continued*)

"Diagnose a Suspected Hardware Problem with a T3 Interface" on page 56	Command or Action
2. Set Clocking to Internal on page 58	[edit interfaces <i>interface-name</i>] set clocking internal show commit
3. Verify That the T3 Interface Is Up on page 59	show interfaces t3- <i>fpc/pic/port</i>
4. Clear T3 Interface Statistics on page 60	clear interfaces statistics t3- <i>fpc/pic/port</i>
5. Force the Link Layer To Stay Up on page 60	
a. Configure Encapsulation to Cisco-HDLC on page 60	[edit interfaces <i>interface-name</i>] set encapsulation cisco-hdlc show commit
b. Configure No-Keepalives on page 61	[edit interfaces <i>interface-name</i>] set no-keepalives show commit
6. Verify the Status of the Logical Interface on page 62	show interfaces t3- <i>fpc/pic/port</i> show interfaces t3- <i>fpc/pic/port</i> terse
7. Ping the T3 Interface on page 63	ping interface t3- <i>fpc/pic/port</i> local-IP-address bypass-routing count 1000 rapid
8. Check for T3 Interface Error Statistics on page 63	show interfaces t3- <i>fpc/pic/port</i> extensive
"Diagnose a Suspected Circuit Problem" on page 65	
1. Create a Loop from the Router to the Network on page 65	[edit interfaces <i>interface-name</i> t3-options] set loopback remote show commit
2. Create a Loop to the Router from Various Points in the Network on page 66	Perform Steps 2 through 8 from "Diagnose a Suspected Hardware Problem with a T3 Interface" on page 56.

Diagnose a Suspected Hardware Problem with a T3 Interface

Problem When you suspect a hardware problem, take the following steps to help verify if there is a hardware problem.

Solution To diagnose a suspected hardware problem with a T3 interface, follow these steps:

- [Create a Loopback on page 57](#)
- [Set Clocking to Internal on page 58](#)
- [Verify That the T3 Interface Is Up on page 59](#)
- [Clear T3 Interface Statistics on page 60](#)
- [Force the Link Layer To Stay Up on page 60](#)
- [Verify the Status of the Logical Interface on page 62](#)
- [Ping the T3 Interface on page 63](#)
- [Check for T3 Interface Error Statistics on page 63](#)

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 transmit and receive ports. 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 57](#)
2. [Configure a Local Loopback on page 57](#)

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 without physically connecting the transmit port to the receive port, 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 local
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t3-1/0/0 t3-options]
user@host# show
loopback local;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0 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.

Set Clocking to Internal

Purpose You set clocking to internal because there is no external clock source in a loopback connection.

Action To configure clocking to internal, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces interface-name
```

2. Configure clocking to internal:

```
[edit interfaces interface-name]
user@host# set clocking internal
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t3-1/0/0]
user@host# show
clocking internal;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0]
user@host# commit
commit complete
```


Meaning The clock source for the interface is set to the internal Stratum 3 clock.

Verify That the T3 Interface Is Up

Purpose Display the status of the T3 interface to provide the information you need to determine whether the physical link is up or down.

Action To verify that the status of the T3 interface is up, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces t3-fpc/pic/port
```

Sample Output The following output is for a T3 interface with the physical link up:

```
user@router> show interfaces t3-1/0/0
Physical interface: t3-1/0/0, Enabled, Physical link is Up
  Interface index: 9, SNMP ifIndex: 10
  Link-level type: PPP, MTU: 4474, Clocking: Internal
  Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
  Device flags : Present Running Loop-Detected
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps
  Link flags : Keepalives
  Keepalive Input: 6684 (00:07:51 ago), Output: 6693 (00:06:41 ago)
  NCP state: Down, LCP state: Conf-req-sent
  Input rate : 224 bps (2 pps), Output rate: 240 bps (2 pps)
  Active alarms : None
  Active defects : None
  Logical interface t3-1/0/0.0 (Index 13) (SNMP ifIndex 32)
    Flags: Device-down 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: 1.1.1.0/30, Local: 1.1.1.1
```

Meaning The sample output shows that the physical link is up, the loop is detected, and there are no T3 alarms or defects.

Sample Output If the physical link is down, there may be a problem with the port. The following output is an example of the `show interfaces t3-fpc/pic/port` command when the physical link is down:

```
user@router> show interfaces t3-1/0/0
Physical interface: t3-1/0/0, Enabled, Physical link is Down
  Interface index: 9, SNMP ifIndex: 10
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal
  Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
  Device flags : Present Running Down
  Interface flags: Hardware-Down Link-Layer-Down Point-To-Point SNMP-Traps
  Link flags : Keepalives
  Keepalive Input: 116 (00:02:32 ago), Output: 185 (00:00:02 ago)
  Input rate : 0 bps (0 pps), Output rate: 0 bps (0 pps)
  Active alarms : LOF, LOS
  Active defects : LOF, LOS
  Logical interface t3-1/0/0.0 (Index 12) (SNMP ifIndex 32)
    Flags: Device-down Point-To-Point SNMP-Traps, Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 4470
```

Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 1.1.1.0/30, Local: 1.1.1.1

Meaning The sample output shows that the physical link is down, the device flags and interface flags are down, and that there are T3 alarms and defects. Verify that the fiber can successfully loop a known good port of the same type by checking for damage to the cable.

Clear T3 Interface Statistics

Purpose You must reset T3 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 diagnostics.

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
```

Sample Output

```
user@host> clear interfaces statistics t3-4/0/2
user@host>
```

Meaning This command clears the interface statistics counters for interface **t3-4/0/2** only.

Force the Link Layer To Stay Up

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.

To force the link layer to stay up, follow these steps:

1. [Configure Encapsulation to Cisco-HDLC on page 60](#)
2. [Configure No-Keepalives on page 61](#)

Configure Encapsulation to Cisco-HDLC

Action To configure encapsulation on a T3 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 t3-1/0/0]
user@host# show
encapsulation hdlc;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0]
user@host# commit
commit complete
```

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 T3 physical 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 t3-1/0/0]
user@host# show
no-keepalives;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0]
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 two Junos OS CLI operational mode commands:

Action `user@host# show interfaces t3-fpc/pic/port`
`user@host# show interfaces t3-fpc/pic/terse`

Sample Output The following sample output is for a T3 logical interface that is up:

```
user@router> show interfaces t3-1/0/0
Physical interface: t3-1/0/0, Enabled, Physical link is Up
  Interface index: 13, SNMP ifIndex: 12
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal, Speed: T3, Loopback:
  None, FCS: 16,
  Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : No-Keepalives
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None
  Logical interface t3-1/0/0.0 (Index 126) (SNMP ifIndex 13)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 4470, Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 1.1.1.0/30, Local: 1.1.1.1

user@router> show interfaces terse t3-1/0/0
Interface      Admin Link Proto Local              Remote
t3-1/0/0        up    up
t3-1/0/0.0      up    up   inet  1.1.1.1/30
```

Meaning The sample output for the first command shows that the logical link is up because there are no flags indicating that the link layer is down. The output for the `show interfaces terse` command shows that logical interface `t3-1/0/0` is up.

Sample Output The following sample output is for a T3 logical interface that is down:

```
user@router> show interfaces t3-0/2/0
Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 13, SNMP ifIndex: 12
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal, Speed: T3, Loopback:
  None, FCS: 16,
  Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 9 (00:00:04 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None
  Logical interface t3-0/2/0.0 (Index 126) (SNMP ifIndex 13)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 4470, Flags: None
```

```
user@router> show interfaces terse t3-0/2/0
Interface      Admin Link Proto Local                                     Remote
t3-0/2/0       up    down
t3-0/2/0.0     up    down inet 1.1.1.1/30
```

Ping the T3 Interface

Meaning This command sends 1000 ping packets out of the interface to the local IP address. The ping should complete successfully with no packet loss. If there is any persistent packet loss, open a case with the Juniper Networks Technical Assistance Center (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).

Check for T3 Interface Error Statistics

Sample Output

```
user@router> show interfaces t3-1/0/0 extensive
Physical interface: t3-1/0/0, Enabled, Physical link is Down
Interface index: 9, SNMP ifIndex: 10
Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal
Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
```

```

Device flags   : Present Running Down
Interface flags: Hardware-Down Link-Layer-Down Point-To-Point SNMP-Traps
Link flags     : Keepalives
Keepalive statistics:
  Input : 116 (last seen 00:02:59 ago)
  Output: 187 (last seen 00:00:09 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes :          2552          0 bps
  Output bytes :          3703          0 bps
  Input packets:           116          0 pps
  Output packets:          161          0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 229, Policed discards: 1
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0
  SRAM errors: 0, HS link CRC errors: 0
Output errors:
  Carrier transitions: 4, Errors: 0, Drops: 0, Aged packets: 0
Active alarms   : LOF, LOS
Active defects  : LOF, LOS
DS3 Media:
  Seconds      Count  State
PLL Lock       0        0 OK
Reframing      273        2 Defect Active
AIS            0        0 OK
LOF            273        2 Defect Active
LOS            273        2 Defect Active
IDLE           0        0 OK
YELLOW         0        0 OK
BPV            0        0
EXZ            0        0
LCV            275    18022125
PCV            0        0
CCV            0        0
LES            275
PES            273
PSES           273
CES            273
CSES           273
SEFS           273
UAS            277
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
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^3 - 1, Pseudorandom (1), Error rate: 10e-0
PFE configuration:
  Destination slot: 1, Stream number: 0, PLP byte: 1 (0x00)
  COS transmit queue bandwidth:
    Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
  COS weighted round robin:
    Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
Logical interface t3-1/0/0.0 (Index 12) (SNMP ifIndex 32)
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: 1.1.1.0/30, Local: 1.1.1.1, Broadcast: Unspecified

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

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. [Create a Loop from the Router to the Network on page 65](#)
2. [Create a Loop to the Router from Various Points in the Network on page 66](#)

Create a Loop from the Router to the Network

Purpose Creating a loop from the router to the network allows the transport-layer engineer to test the router from various points in the network. This helps the engineer isolate where the problem is located.

Action To create a loop from the router to the network, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interface interface-name t3-options
```

2. Configure the remote loopback:

```
[edit interfaces interface-name t3-options]
user@host# set loopback remote
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t3-1/0/0 t3-options]
user@host# show
loopback remote;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0 t3-options]
user@host# commit
commit complete
```

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 so that you can then perform tests to verify the connection from the router to that loopback in the network.

Action To verify the connection from the router to a loopback in the network, follow Steps 2 through 8 in [“Diagnose a Suspected Hardware Problem with a T3 Interface” on page 56](#).

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.

CHAPTER 8

Locate T3 Alarms and Errors

This chapter describes the most common T3 alarms and errors you can encounter when investigating line problems on a Juniper Networks router.

- [Checklist of Common T3 Alarms and Errors on page 67](#)
- [Display T3 Alarms and Errors on page 68](#)
- [Locate Most Common T3 Alarms and Errors on page 69](#)

Checklist of Common T3 Alarms and Errors

Purpose To check T3 alarms and errors,

Action [Table 19 on page 67](#) provides the links and commands for checking T3 alarms and errors.

Table 19: Checklist of Common T3 Alarms and Errors

Tasks	Command or Action
“Display T3 Alarms and Errors” on page 68	<code>show interfaces t3-<i>fpc/pic/port</i> extensive</code>
“Locate Most Common T3 Alarms and Errors” on page 69	
1. Locate Loss of Signal and Loss of Frame Alarms on page 69	Check the connection between the router port and the first T3 network element.
2. Locate Alarm Indication Signal Alarms on page 70	Check the T3 network element connected to the T3 interface.
3. Locate an Incoming Yellow Alarm on page 71	Check the cable between the T3 interface and the directly connected T3 network element.
4. Locate IDLE on a T3 Interface on page 71	Check that the line is provisioned for service.



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.

Display T3 Alarms and Errors

Purpose To display T3 alarms and errors, use the following Junos OS command-line interface (CLI) operational mode command:

Action user@host> show interfaces t3-fpc/pic/port extensive

Sample Output

```

user@host> show interfaces t3-1/0/0 extensive
Physical interface: t3-1/0/0, Enabled, Physical link is Down
Interface index: 9, SNMP ifIndex: 10
Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal
Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
Device flags   : Present Running Down
Interface flags: Hardware-Down Link-Layer-Down Point-To-Point SNMP-Traps
Link flags     : Keepalives
Keepalive statistics:
  Input : 116 (last seen 00:02:59 ago)
  Output: 187 (last seen 00:00:09 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :                2552                0 bps
  Output bytes  :                3703                0 bps
  Input packets :                116                0 pps
  Output packets:                161                0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 229, Policed discards: 1
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0
  SRAM errors: 0, HS link CRC errors: 0
Output errors:
  Carrier transitions: 4, Errors: 0, Drops: 0, Aged packets: 0
Active alarms : LOF, LOS   - DS-3 active alarms and defects
Active defects : LOF, LOS
DS3 Media:
Seconds      Count  State  - T3 media-specific errors
PLL Lock      0         0  OK
Reframing    273         2  Defect Active
AIS           0         0  OK
LOF          273         2  Defect Active
LOS          273         2  Defect Active
IDLE          0         0  OK
YELLOW        0         0  OK
BPV           0         0
EXZ           0         0
LCV          275    18022125
PCV           0         0
CCV           0         0
LES          275
PES          273
PSES         273
CES          273
CES          273
SEFS         273
UAS          277
[...Output truncated...]

```

Meaning The sample output shows 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 second 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).

[Table 20 on page 69](#) lists the T3 media-specific alarms or errors that can render the interface unable to pass packets.

Table 20: 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

Locate Most Common T3 Alarms and Errors

The following alarms and errors are described in this chapter:

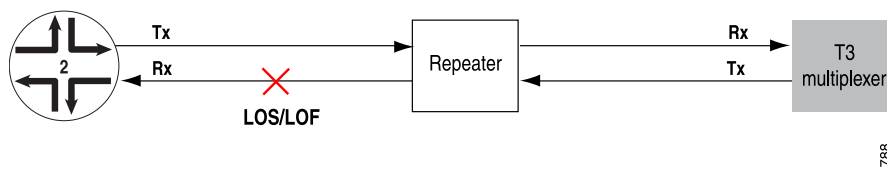
1. [Locate Loss of Signal and Loss of Frame Alarms on page 69](#)
2. [Locate Alarm Indication Signal Alarms on page 70](#)
3. [Locate an Incoming Yellow Alarm on page 71](#)
4. [Locate IDLE on a T3 Interface on page 71](#)

Locate Loss of Signal and Loss of Frame Alarms

Problem A loss of signal (LOS) or loss of frame (LOF) alarm indicates that a signal could not be detected at the T3 interface.

Solution To locate the LOS or LOF alarm, check the connection between the router port and the first T3 network element. In the example network in [Figure 6 on page 70](#), the X indicates that there is a connection problem between Router 2 and the nearest T3 network element.

Figure 6: Location of an LOS or LOF Alarm in a T3 Network



NOTE: Tx represents the transmit port and Rx represents the receive port.

Sample Output

```
user@router2> show interfaces t3-1/1/1 extensive
[... Output truncated...]
Active alarms : LOF, LOS
Active defects : LOF, LOS
DS3 Media:
Seconds      Count  State
PLL Lock      0      0 OK
Reframing    273      2 Defect Active
AIS           0      0 OK
LOF          273      2 Defect Active
LOS          273      2 Defect Active
[...Output truncated...]
```

Meaning The sample output shows that Router 2 (Rx) detected a cumulative LOS and LOF for 273 seconds. The defect was declared twice during that time.

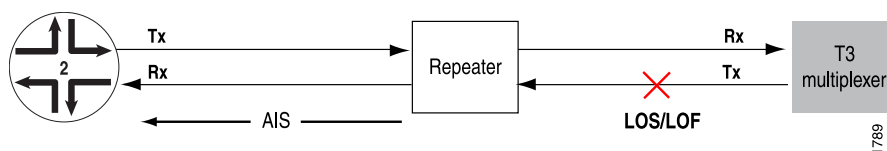
Locate Alarm Indication Signal Alarms

Problem An alarm indication signal (AIS) is a valid framed signal with payload containing a repeating 1010 pattern. An AIS alarm indicates a problem with the line upstream from the T3 network element connected to the T3 interface.

Solution To locate the AIS alarm, have the carrier check the T3 network element connected to the T3 interface and trace the problem.

All diagnostics are from the perspective of Router 2 (the Juniper Networks router). [Figure 7 on page 70](#) illustrates the location of an AIS alarm in a T3 network.

Figure 7: Location of an AIS Alarm in a T3 Network



Meaning In [Figure 7 on page 70](#), the X indicates that there is an LOS or LOF alarm between the repeater and the Tx T3 multiplexer. An AIS alarm is sent from the repeater to Router 2.

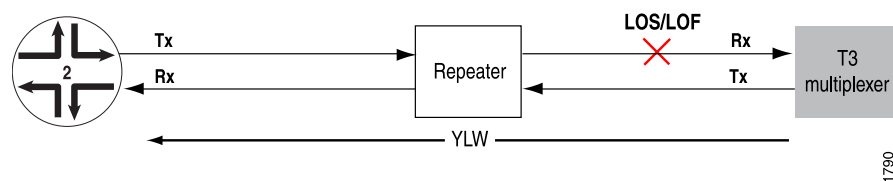
Locate an Incoming Yellow Alarm

Problem An incoming yellow alarm indicates that the T3 network element connected to the T3 interface has a problem with the signal it is receiving from the T3 interface.

Solution To locate the yellow alarm, check the cable between the T3 interface and the directly connected T3 network element.

All diagnostics are from the perspective of Router 2. [Figure 8 on page 71](#) illustrates the location of a yellow alarm in a T3 network.

Figure 8: Location of a Yellow Alarm in a T3 Network



Meaning The T3 multiplexer detects an LOS or LOF on its connection from Router 2 and sends a yellow (YLW) alarm to Router 2.

Locate IDLE on a T3 Interface

Problem The T3 (DS3) IDLE signal is a validly framed DS3 signal with a payload consisting of a repeated 1100 signal. IDLE indicates that the line has not been provisioned for service.

Solution Have the carrier make sure that the line is provisioned for service.

Sample Output

```
user@router2> show interfaces t3-1/1/0
Physical interface: t3-1/1/0, Enabled, Physical link is Down
  Interface index: 13, SNMP ifIndex: 21
  Link-level type: PPP, MTU: 4474, Clocking: Internal
  Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Input rate     : 0 bps (0 pps), Output rate: 0 bps (0 pps)
  Active alarms  : IDLE
  Active defects : IDLE
```


PART 4

Investigate ATM Interfaces

- [Determine ATM Interface Type on page 75](#)
- [Monitor ATM Interfaces on page 85](#)
- [Use Loopback Testing for ATM Interfaces on page 101](#)
- [Locate ATM Alarms and Errors on page 117](#)

Determine ATM Interface Type

This chapter describes how to determine the type of Asynchronous Transfer Mode (ATM) interface on your router.

- [Checklist for Determining ATM Interface Type on page 75](#)
- [Determine the ATM Interface Type and Configuration on page 76](#)
- [Determine the ATM Interface Type on page 77](#)
- [Check that the ATM Configuration Is Correct on page 77](#)
- [Examples of Incorrect Configurations of ATM Options on page 79](#)

Checklist for Determining ATM Interface Type

Purpose To determine the type of Asynchronous Transfer Mode (ATM) interface on your router.

Action [Table 21 on page 75](#) provides the links and commands for determining the type of ATM interface on your router.

Table 21: Checklist for Determining ATM Interface Type

Tasks	Command or Action
“Determine the ATM Interface Type and Configuration” on page 76	
1. Determine the ATM Interface Type on page 77	<code>show chassis hardware</code>
2. Check that the ATM Configuration Is Correct on page 77	
a. Check the Configuration of an ATM1 Interface on page 78	<code>show configuration interfaces at-fpc/pic/port</code>
b. Check the Configuration of an ATM2 IQ Interface on page 78	<code>show configuration interfaces at-fpc/pic/port</code>
“Examples of Incorrect Configurations of ATM Options” on page 79	

Table 21: Checklist for Determining ATM Interface Type (*continued*)

Tasks	Command or Action
1. Check the Configuration of the VCI on an ATM1 Interface on page 80	<pre>show configuration interfaces at-<i>fpc/pic/port</i> show interfaces terse at-<i>fpc/pic/port</i> edit edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i> maximum-vcs <i>maximum-vcs</i> show commit show configuration interfaces at-<i>fpc/pic/port</i> run show interfaces terse at-<i>fpc/pic/port</i></pre>
2. Check the Configuration of the VCI on an ATM2 IQ Interface on page 81	<pre>show configuration interfaces at-<i>fpc/pic/port</i> show interfaces terse at-<i>fpc/pic/port</i> edit edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i> delete maximum-vcs show commit show configuration interfaces at-<i>fpc/pic/port</i> run show interfaces terse at-<i>fpc/pic/port</i></pre>
3. Check the Configuration of Promiscuous Mode on an ATM2 IQ Interface on page 82	<pre>show configuration interfaces at-<i>fpc/pic/port</i> show interfaces terse at-<i>fpc/pic/port</i> edit set interfaces <i>interface-name</i> atm-options pic-type atm 2 show commit show configuration interfaces at-<i>fpc/pic/port</i> run show interfaces terse at-<i>fpc/pic/port</i></pre>

- Related Documentation**
- [Determine the ATM Interface Type and Configuration on page 76](#)
 - [Determine the ATM Interface Type on page 77](#)
 - [Check that the ATM Configuration Is Correct on page 77](#)
 - [Examples of Incorrect Configurations of ATM Options on page 79](#)

Determine the ATM Interface Type and Configuration

Purpose When you know the type of ATM interface on your router, you can configure it with the correct configuration options.

For ATM1 and ATM2 intelligent queuing (IQ) interfaces, the Junos OS does not determine from the interface name **at-*fpc/pic/port*** whether your routing platform has an ATM1 or ATM2 IQ Physical Interface Card (PIC) installed.

Action To determine the type of ATM interface on your router and to check your ATM interface configuration, follow these steps:

1. [Determine the ATM Interface Type on page 77](#)

2. [Check that the ATM Configuration Is Correct on page 77](#)

- Related Documentation**
- [Checklist for Determining ATM Interface Type on page 75](#)
 - [Determine the ATM Interface Type on page 77](#)
 - [Check that the ATM Configuration Is Correct on page 77](#)
 - [Examples of Incorrect Configurations of ATM Options on page 79](#)

Determine the ATM Interface Type

Purpose	To determine the type of ATM interface on your router, use the following Junos OS command-line interface (CLI) operational mode command:
Action	<code>user@host> show chassis hardware</code>
Sample Output	<pre> user@host> show chassis hardware Hardware inventory: Item Version Part number Serial number Description Chassis 50992 M10 Midplane REV 03 710-001950 HB2090 Power Supply B Rev 04 740-002497 LJ23082 AC Display REV 04 710-001995 HC5151 Routing Engine 9700000792694801 RE-2.0 FEB REV 06 710-003310 HH0211 E-FEB FPC 0 E-FPC PIC 0 REV 06 750-002992 HP2711 4x F/E, 100 BASE-TX PIC 1 REV 02 750-005718 BE6774 1x OC-12 ATM-II IQ, MM PIC 3 REV 04 750-002971 HC8106 4x OC-3 SONET, MM FPC 1 E-FPC PIC 1 REV 03 750-000612 AA7399 2x OC-3 ATM, MM PIC 3 REV 02 750-000618 AE2070 4x T3 </pre>
Meaning	The sample output shows the hardware inventory. The ATM2 IQ interface is in Flexible PIC Concentrator (FPC) slot 0, and PIC slot 1, which translates to at-fpc/pic/port or at-0/1/0 . The ATM1 interface name is at-1/1/0 .
Related Documentation	<ul style="list-style-type: none"> • Checklist for Determining ATM Interface Type on page 75 • Determine the ATM Interface Type and Configuration on page 76 • Check that the ATM Configuration Is Correct on page 77 • Examples of Incorrect Configurations of ATM Options on page 79

Check that the ATM Configuration Is Correct

The supported set of configuration options varies between the ATM1 and ATM2 IQ interfaces. If you configure an ATM1 interface using ATM2 IQ configuration options, the configuration does not commit. The same occurs if you configure an ATM2 IQ interface

with ATM1 options. See the *Junos Network Interfaces Configuration Guide* for more information on the options supported for ATM1 and ATM2 IQ interfaces.

1. [Check the Configuration of an ATM1 Interface on page 78](#)
2. [Check the Configuration of an ATM2 IQ Interface on page 78](#)

Check the Configuration of an ATM1 Interface

Purpose The Junos OS assumes an ATM1 interface configuration if you include the **maximum-vcs** statement without the **pic-type** statement at the **[edit interfaces at-fpc/pic/port atm-options]** hierarchy level,

Action To check the configuration of an ATM1 interface, use the following Junos OS CLI operational mode command:

```
user@host> show configuration interfaces at-fpc/pic/port
```

Sample Output 1

```
user@host> show configuration interfaces at-0/1/0
atm-options {
  vpi 1 {
    maximum-vcs 1024;
  }
}
unit 100 {
  vci 1.100;
  family inet {
    address 25.25.25.2/30;
  }
}
```

Sample Output 2

```
user@host> show configuration interfaces at-1/0/0
atm-options {
  pic-type atm1;
  vpi 0 maximum-vcs 256;
  vpi 1 maximum-vcs 512;
}
```

Meaning The sample output shows the correct configuration of an ATM1 interface. Sample output 1 shows the **maximum-vcs** statement configured on an ATM interface. Because the **pic-type** statement is not included in the configuration, this interface is assumed to be an ATM1 interface. Use the **show chassis hardware** command to verify that the interface is an ATM1. Otherwise this could be the incorrect configuration of an ATM2 IQ interface. Sample output 2 shows the correct configuration of an ATM1 interface with the **pic-type** statement and the **maximum-vcs** statement.

Check the Configuration of an ATM2 IQ Interface

Purpose ATM2 IQ interfaces must *not* have the **maximum-vcs** statement included in the configuration.

Action To check the configuration on an ATM2 IQ interface, use the following CLI operational mode command:

```
user@host> show configuration interfaces at-fpc/pic/port
```

Sample Output 1

```
user@host> show configuration interfaces at-0/1/0
atm-options {
    vpi 1;
}
unit 100 {
    vci 1.100;
    family inet {
        address 25.25.25.1/30;
    }
}
```

Sample Output 2

```
user@host> show configuration interfaces at-2/2/0
atm-options {
    pic-type atm2 ;
    vpi 1;
}
unit 100 {
    encapsulation ether-over-atm-llc;
    vci 1.100;
    shaping {
        vbr peak 66k sustained 66k burst 40;
    }
    family inet {
        address 192.168.5.1/24;
    }
}
[...Output truncated...]
```

Meaning The sample output shows the correct configuration of an ATM2 IQ interface. The first example shows that the interface **at-0/1/0** has ATM options configured and the logical interface **at-0/1/0.100**. Sample output 2 shows another interface **at-2/2/0** with the PIC type configured.



NOTE: The ATM2 IQ interface does *not* have the `maximum-vcs` statement included in the configuration.

Related Documentation

- [Checklist for Determining ATM Interface Type on page 75](#)
- [Determine the ATM Interface Type and Configuration on page 76](#)
- [Examples of Incorrect Configurations of ATM Options on page 79](#)

Examples of Incorrect Configurations of ATM Options

Even though ATM1 and ATM2 IQ interfaces may be configured with the incorrect options, the configuration may commit but the logical interface may not come up. Here are some examples of incorrectly configured options:

1. [Check the Configuration of the VCI on an ATM1 Interface on page 80](#)
2. [Check the Configuration of the VCI on an ATM2 IQ Interface on page 81](#)
3. [Check the Configuration of Promiscuous Mode on an ATM2 IQ Interface on page 82](#)

Check the Configuration of the VCI on an ATM1 Interface

Purpose If your configuration of the virtual channel identifier (VCI) is incorrect, the logical interface is not created.

Action To check that VCI is configured correctly on your ATM1 interface, follow these steps:

1. Check the configuration with the following Junos OS CLI operational mode command:

```
user@host> show configuration interfaces at-fpc/pic/port
```

For example, the following output shows an *incorrectly* configured ATM1 interface:

```
user@host> show configuration interfaces at-1/2/0

atm-options {
  vpi 1;
} <<< the maximum-vcs statement is missing
unit 100 {
  vci 1.100;
  family inet {
    address 25.25.25.2/30;
  }
}
```

2. Check if the logical interface unit 100 is created with the following command:

```
user@host> show interfaces terse at-fpc/pic/port
```

For example, the following output shows that the link is not created:

```
user@host> show interfaces terse at-1/2/0

Interface           Admin Link Proto Local           Remote
at-1/2/0            up      up
<<< missing logical interface at-1/2/0.100
```

3. Include the **maximum-vcs** statement in the configuration:

```
user@host> edit
user@host# edit interfaces interface-name atm-options vpi vpi-identifier
maximum-vcs maximum-vcs
user@host# show
user@host# commit
```

For example, the following output shows a *correctly* configured ATM1 interface:

```
user@host> show configuration interfaces at-0/1/0
atm-options {
  vpi 1 {
    maximum-vcs 1024;
  }
}
unit 100 {
  vci 1.100;
  family inet {
    address 25.25.25.2/30;
  }
}
```

```
}
}
```

1. Check that the logical interface is created with the following command:

```
user@host> run show interfaces terse at-fpc/pic/port
```

For example, the following output shows that the link is created:

```
user@host# run show interfaces terse at-1/2/0
```

Interface	Admin	Link	Proto	Local	Remote
at-1/2/0	up	up			
at-1/2/0.100	up	up	inet	25.25.25.2/30	

Meaning The steps above show that initially the logical interface **at-1/2/0.100** is not created because the **maximum-vcs** statement is not included in the ATM1 configuration. When that statement is included, the logical interface is created.

Check the Configuration of the VCI on an ATM2 IQ Interface

Purpose If your configuration of the VCI is incorrect, the logical interface is not created.

Action To check that VCI is configured correctly on your ATM2 IQ interface, follow these steps:

1. Check the configuration with the following Junos OS CLI operational mode command:

```
user@host> show configuration interfaces at-fpc/pic/port
```

For example, the following output shows an *incorrectly* configured ATM2 IQ interface:

```
user@host> show configuration interfaces at-0/1/0
```

```
atm-options {
  vpi 1 {
    maximum-vcs 200; <<< incorrectly included
  }
}
unit 100 {
  vci 1.100;
  family inet {
    address 25.25.25.1/30;
  }
}
```

2. Check if the logical interface unit 100 is created with the following command:

```
user@host> show interfaces terse at-fpc/pic/port
```

For example, the following output shows that the link is not created:

```
user@host> show interfaces terse at-0/1/0
```

Interface	Admin	Link	Proto	Local	Remote
at-0/1/0	up	up			
<<< missing logical interface at-0/1/0.100					

3. Delete the incorrect **maximum-vcs** statement from the configuration:

```
user@host> edit
```

```

user@host# edit interfaces interface-name atm-options vpi vpi-identifier
user@host# delete maximum-vcs
user@host# show
user@host# commit

```

For example, the following output shows a *correctly* configured ATM2 IQ interface:

```

user@host> show configuration interfaces at-0/1/0

atm-options {
    vpi 1 {
    }
}
unit 100 {
    vci 1.100;
    family inet {
        address 25.25.25.1/30;
    }
}

```

4. Check that the logical interface is created with the following command:

```

user@host> show interfaces terse at-fpc/pic/port

```

For example, the following output shows that the link is created:

```

user@host> show interfaces terse at-0/1/0

Interface           Admin Link Proto Local           Remote
at-0/1/0            up    up
at-0/1/0.100        up  up  inet 25.25.25.1/30

```

Meaning The steps above show that initially the logical interface **at-0/1/0.100** is not created because the **maximum-vcs** statement is included in the ATM2 IQ configuration. When that statement is deleted, the logical interface is created.

Check the Configuration of Promiscuous Mode on an ATM2 IQ Interface

Purpose If your configuration of promiscuous mode is incorrect, the logical interface is not created. ATM2 IQ interfaces must have the **pic-type atm2** statement included if you are including the **promiscuous-mode** statement in the configuration.

Action To check that promiscuous mode is configured correctly on your ATM2 IQ interface, follow these steps:

1. Check the configuration with the following Junos OS CLI operational mode command:

```

user@host> show configuration interfaces at-fpc/pic/port

```

For example, the following output shows promiscuous mode *incorrectly* configured on an ATM2 IQ interface:

```

user@host> show configuration interfaces at-1/2/0

encapsulation atm-ccc-cell-relay;
atm-options {
    promiscuous-mode { <<< the pic-type statement is missing
    vpi 1;
}

```



```

    }
  }
  unit 1 {
    vpi 1;
  }
}

```

2. Check if the logical interface unit 1 is created with the following command:

```
user@host> run show interfaces terse at-fpc/pic/port
```

For example, the following output shows that the link is not created:

```
user@host# run show interfaces terse at-0/1/0
```

Interface	Admin	Link	Proto	Local	Remote
at-0/1/0	up	up			

<<< missing logical interface at-0/1/0.1

3. Include the **pic-type** statement in the configuration:

```
user@host> edit
user@host# set interfaces interface-name atm-options pic-type atm2
user@host# show
user@host# commit

```

For example, the following output shows promiscuous mode correctly configured on an ATM2 IQ interface:

```
user@host> show configuration interfaces at-0/1/0

encapsulation atm-ccc-cell-relay;
atm-options {
  pic-type atm2;
  promiscuous-mode {
    vpi 1;
  }
}
unit 1 {
  vpi 1;
}

```

4. Check that the logical interface is created with the following command:

```
user@host> run show interfaces terse at-fpc/pic/port
```

For example, the following output shows that the link is created:

```
user@host# run show interfaces terse at-0/1/0
```

Interface	Admin	Link	Proto	Local	Remote
at-0/1/0	up	up			
at-0/1/0.1	up	up	ccc		

Meaning The steps above show that initially the logical interface **at-0/1/0.1** is not created because the **pic-type** statement is not included with the **promiscuous-mode** statement in the ATM2 IQ configuration. When that statement is included, the logical interface is created.

Related Documentation

- [Checklist for Determining ATM Interface Type on page 75](#)
- [Determine the ATM Interface Type and Configuration on page 76](#)

- [Check that the ATM Configuration Is Correct on page 77](#)

CHAPTER 10

Monitor ATM Interfaces

This chapter describes how to monitor Asynchronous Transfer Mode (ATM) interfaces and begin the process of isolating ATM interface problems when they occur.

- [Checklist for Monitoring ATM Interfaces on page 85](#)
- [Monitor ATM Interfaces on page 86](#)
- [Monitor ATM1 Interfaces on page 87](#)
- [Monitor ATM2 IQ Interfaces on page 91](#)

Checklist for Monitoring ATM Interfaces

Purpose To monitor Asynchronous Transfer Mode (ATM) interfaces and begin the process of isolating ATM interface problems when they occur.

Action [Table 22 on page 85](#) provides the links and commands for monitoring ATM interfaces.

Table 22: Checklist for Monitoring ATM Interfaces

Tasks	Command or Action
“Monitor ATM Interfaces” on page 86	<code>show interfaces terse at*</code>
“Monitor ATM1 Interfaces” on page 87	
1. Display the Status of a Specific ATM1 Interface on page 87	<code>show interfaces at-<i>fpc/pic/port</i></code>
2. Display Extensive Status Information for a Specific ATM1 Interface on page 87	<code>show interfaces at-<i>fpc/pic/port</i> extensive</code>
3. “Monitor Statistics for an ATM1 Interface” on page 89	<code>monitor interface at-<i>fpc/pic/port</i></code>
“Monitor ATM2 IQ Interfaces” on page 91	
1. Display the Status of a Specific ATM2 IQ Interface on page 91	<code>show interfaces terse at-<i>fpc/pic/port</i></code> <code>show interfaces at-<i>fpc/pic/port</i></code>
2. Display Extensive Information for a Specific ATM2 Interface on page 93	<code>show interfaces at-<i>fpc/pic/port</i> extensive</code>
3. Monitor Statistics for an ATM2 Interface on page 98	<code>monitor interface at-<i>fpc/pic/port</i></code>

Monitor ATM Interfaces

Purpose By monitoring ATM interfaces, you begin the process of isolating ATM interface problems when they occur. The following command provides the status of all ATM interfaces on the router. See [“Checklist for Determining ATM Interface Type” on page 75](#) for information on how to determine the ATM interface type.

Action To display the status of all ATM interfaces, use the following Junos OS command-line interface (CLI) operational mode command:

```
user@host> show interfaces terse at*
```

Sample Output

The following sample output is for an ATM1 interface:

```
user@host> show interfaces terse at*
Interface           Admin Link Proto Local Remote
at-2/0/0            up    up
at-2/2/0.100        up    up   inet  10.16.5.1/24
at-2/2/0.101        up    up   inet  10.16.250.253/30
at-2/2/0.200        up    up   inet  20.20.20.1/30
at-2/2/0.300        up    up   inet  30.30.30.1/30
at-2/2/0.400        up    up   inet  40.40.40.1/30
at-2/2/0.32767      up    up
at-2/0/1            up    down
at-2/0/1.10         up    down inet  10.10.100.1/30
```

Meaning The sample output lists only the ATM interfaces and shows the status of both the physical and logical interfaces. See [Table 23 on page 86](#) for a description of what the output means. You cannot determine from this output whether the interfaces are ATM1 or ATM2 intelligent queuing (IQ). See [“Checklist for Determining ATM Interface Type” on page 75](#) for information on how to determine the ATM interface type.

Table 23: Status of ATM Interfaces

Physical Interface	Logical Interface	Status Description
at-2/0/0	at-2/0/0.100	Both the physical and logical links are up and running on this interface. By default on an ATM interface, if the physical link is up, the logical link is also up. However, for ATM1 or ATM2 IQ interfaces with an ATM encapsulation and OAM configured for the VC, even if the physical interface is up, the logical link for a VC can be down due to a VC misconfiguration.
Admin Up	Admin Up	
Link Up	Link Up	
at-2/0/1	at-2/0/1.10	The physical link is down on this interface and therefore the logical interface is down also.
Admin Up	Admin Up	
Link Down	Link Down	

Monitor ATM1 Interfaces

To monitor an ATM1 interface, follow these steps:

1. [Display the Status of a Specific ATM1 Interface on page 87](#)
2. [Display Extensive Status Information for a Specific ATM1 Interface on page 87](#)
3. [Monitor Statistics for an ATM1 Interface on page 89](#)

Display the Status of a Specific ATM1 Interface

Purpose To display the status of a specific ATM interface, use the following Junos OS CLI operational mode command:

Action `user@host> show interfaces at-fpc/pic/port`

Meaning The first line of the sample output shows that the physical link is down and therefore the logical link is down also. This means that the interface cannot pass packets.

Further down the sample output, look for active alarms and defects. If there are any, and to further diagnose the problem, see [“Display Extensive Status Information for a Specific ATM1 Interface” on page 87](#) to display more extensive information about the ATM interface and the physical interface that is down.

Display Extensive Status Information for a Specific ATM1 Interface

Purpose To display extensive status information about a specific interface, use the following Junos OS CLI operational mode command:

Action `user@host> show interfaces at-fpc/pic/port extensive`

Sample Output

```
user@host> show interfaces at-2/0/1 extensive
Physical interface: at-2/0/1, Enabled, Physical link is Down
  Interface index: 23, SNMP ifIndex: 43, Generation: 22
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed:
OC3 , Loopback: None, Payload scrambler: Enabled
  Device flags   : Present Running Down
  Link flags     : None
  Hold-times    : Up 0 ms, Down 0 ms
  Statistics last cleared: 2002-07-29 14:28:14 EDT (00:18:00 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, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0,
  L2 mismatch timeouts: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  SONET alarms   : LOL, LOS
  SONET defects  : LOL, LOF, LOS, SEF, AIS-L, AIS-P, RDI-P, PLM-P
```

SONET PHY:	Seconds	Count	State
PLL Lock	0	0	OK
PHY Light	1079	0	Light Missing

SONET section:

	Seconds	Count	State
BIP-B1	0	0	
SEF	1079	0	Defect Active
LOS	1079	0	Defect Active
LOF	1079	0	Defect Active
ES-S	1079		
SES-S	1079		
SEFS-S	1079		

SONET line:

	Seconds	Count	State
BIP-B2	0	0	
REI-L	0	0	
RDI-L	0	0	OK
AIS-L	1079	0	Defect Active
BERR-SF	0	0	OK
BERR-SD	0	0	OK
ES-L	1079		
SES-L	1079		
UAS-L	1079		
ES-LFE	0		
SES-LFE	0		
UAS-LFE	0		

SONET path:

	Seconds	Count	State
BIP-B3	0	0	
REI-P	0	0	
LOP-P	0	0	OK
AIS-P	1079	0	Defect Active
RDI-P	1079	0	Defect Active
UNEQ-P	0	0	OK
PLM-P	1079	0	Defect Active
ES-P	1079		
SES-P	1079		
UAS-P	1079		
ES-PFE	1079		
SES-PFE	1079		
UAS-PFE	1079		

Received SONET overhead:

F1	: 0x00, J0	: 0x00, K1	: 0xff, K2	: 0xff
S1	: 0x00, C2	: 0xff, C2(cmp)	: 0x13, 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	: 0x13, F2	: 0x00, Z3	: 0x00
Z4	: 0x00, V5	: 0x00		

ATM status:

HCS state: Hunt

LOC : OK

ATM Statistics:

Uncorrectable HCS errors: 0, Correctable HCS errors: 0, Tx cell FIFO overruns: 0, Rx cell FIFO overruns: 0,

Rx cell FIFO underruns: 0, Input cell count: 0, Output cell count: 381110991, Output idle cell count: 18446744069795695321,

Output VC queue drops: 0, Input no buffers: 0, Input length errors: 0, Input timeouts: 0, Input invalid VCs: 0,

Input bad CRCs: 0, Input OAM cell no buffers: 0

PFE configuration:

Destination slot: 2

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 at-2/0/1.10 (Index 30) (SNMP ifIndex 65) (Generation 29)
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
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, Flags: None, Generation: 32 Route table: 0
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 192.168.100.0/30, Local: 192.168.100.1, Broadcast:
Unspecified, Generation: 61
  VCI 2.100
    Flags: Active
    Total down time: 0 sec, Last down: Never
    ATM per-VC transmit statistics:
      Tail queue packet drops: 0
    Traffic statistics:
      Input bytes :                  0
      Output bytes :                 0
      Input packets:                 0
      Output packets:                0

```

Meaning The sample output is for an OC3 ATM interface and shows the statistics for the SONET media, as well as the **Input** and **Output** ATM errors. Error details include input and output errors, active alarms and defects, and media-specific errors.

If the physical link is down, look at the active alarms and defects for the ATM interface and check the ATM media accordingly. See [“List of Common ATM Alarms and Error”](#) on [page 117](#) for an explanation of ATM alarms.

Monitor Statistics for an ATM1 Interface

Purpose To monitor statistics for an ATM1 interface, use the following Junos OS CLI operational mode command:

Action `user@host> monitor interface at-fpc/pic/port`



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.

Sample Output

```

user@host> monitor interface at-2/0/0
host                               Seconds: 68                               Time: 13:52:33
                                          Delay: 0/0/2

Interface: at-2/0/0, Enabled, Link is Up
Encapsulation: ATM-PVC, Speed: OC3
Traffic statistics:
    Input bytes:                1528168 (2142968 bps)          [1528000]
    Output bytes:               1540192 (2165880 bps)          [1540000]
    Input packets:              1002 (175 pps)                 [1000]
    Output packets:             1002 (175 pps)                 [1000]
Error statistics:
    Input errors:                0                             [0]
    Input drops:                 0                             [0]
    Input framing errors:        0                             [0]
    Policed discards:            0                             [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:                0                             [0]
ATM statistics:
    Input cell count             33049                         [33034]
    Input invalid vc              0                             [0]
    Output cell count            89231368868                   [23664462]
    Output idle cell count 18446744072746574220                [23631438]
Active alarms : None
Active defects: None
SONET error counts/seconds:
    LOS count                    0                             [0]
    LOF count                    0                             [0]
    SEF count                    0                             [0]
    ES-S                         0                             [0]
    SES-S                        0                             [0]
SONET statistics:
    BIP-B1                       0                             [0]
    BIP-B2                       0                             [0]
    REI-L                        0                             [0]
    BIP-B3                       0                             [0]
    REI-P                        0                             [0]
Received SONET overhead: F1      : 0x00 J0      : 0x00Z
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'

```

Meaning The sample output checks for and displays common interface failures and any increases in framing errors. Information from this command can help you 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.

Monitor ATM2 IQ Interfaces

To monitor an ATM2 interface, follow these steps:

1. [Display the Status of a Specific ATM2 IQ Interface on page 91](#)
2. [Display Extensive Information for a Specific ATM2 Interface on page 93](#)
3. [Monitor Statistics for an ATM2 Interface on page 98](#)

Display the Status of a Specific ATM2 IQ Interface

Purpose To display the status of a specific ATM2 IQ interface, use the following Junos OS CLI operational mode commands:

Action `user@host> show interfaces terse at-fpc/pic/port`
`user@host> show interfaces at-fpc/pic/port`

Sample Output 1

```
user@host> show interfaces terse at-2/2/0
Interface           Admin Link Proto Local Remote
at-2/2/0            up    up
at-2/2/0.100        up    up   inet  10.16.5.1/24
at-2/2/0.101        up    up   inet  10.16.250.253/30
at-2/2/0.200        up    up   inet  20.20.20.1/30
at-2/2/0.300        up    up   inet  30.30.30.1/30
at-2/2/0.400        up    up   inet  40.40.40.1/30
at-2/2/0.32767      up    up
```

Sample Output 2

```
user@host> show interfaces at-2/2/0
Physical interface: at-2/2/0, Enabled, Physical link is Up
  Interface index: 138, SNMP ifIndex: 26
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed:
OC12, Loopback: None,
  Payload scrambler: Enabled
  Device flags   : Present Running
  Link flags     : None
  CoS queues     : 4 supported
  Current address: 00:90:69:d6:d5:3a
  Last flapped   : 2004-05-03 14:32:52 UTC (02:41:35 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SONET alarms   : None
  SONET defects  : None
    VPI 1
      Flags: Active
      Total down time: 0 sec, Last down: Never
  Traffic statistics:
    Input packets: 0
    Output packets: 18
  Logical interface at-2/2/0.100 (Index 67) (SNMP ifIndex 36)
    Flags: Point-To-Multipoint SNMP-Traps Encapsulation: Ether-over-ATM-LLC
  Input packets : 0
  Output packets: 7
  Protocol inet, MTU: 1500
  Flags: None
```

```
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 172.16.5/24, Local: 172.16.5.1, Broadcast: 172.16.5.255
VCI 1.100
  Flags: Active, Shaping, Multicast
  VBR, Peak: 66kbps, Sustained: 66kbps, Burst size: 40
  Total down time: 0 sec, Last down: Never
  EPD threshold: 0, Transmit weight cells: 0
  Input packets : 0
  Output packets: 14
Logical interface at-2/2/0.101 (Index 68) (SNMP ifIndex 37)
  Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
  Input packets : 0
  Output packets: 2
  Protocol inet, MTU: 4470
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 172.16.250.252/30, Local: 172.16.250.253, Broadcast:
172.16.250.255
VCI 1.101
  Flags: Active
  Total down time: 0 sec, Last down: Never
  EPD threshold: 0, Transmit weight cells: 0
  Input packets : 0
  Output packets: 2
Logical interface at-2/2/0.200 (Index 69) (SNMP ifIndex 8280)
  Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
  Input packets : 0
  Output packets: 0
  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
VCI 1.200
  Flags: Active
  Total down time: 0 sec, Last down: Never
  EPD threshold: 0, Transmit weight cells: 0
  Input packets : 0
  Output packets: 0
Logical interface at-2/2/0.300 (Index 70) (SNMP ifIndex 8281)
  Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
  Input packets : 0
  Output packets: 0
  Protocol inet, MTU: 4470
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 30.30.30.0/30, Local: 30.30.30.1, Broadcast: 30.30.30.3
VCI 1.300
  Flags: Active
  Total down time: 0 sec, Last down: Never
  EPD threshold: 0, Transmit weight cells: 0
  Input packets : 0
  Output packets: 0
Logical interface at-2/2/0.400 (Index 72) (SNMP ifIndex 8282)
  Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
  Input packets : 0
  Output packets: 0
  Protocol inet, MTU: 4470
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 40.40.40.0/30, Local: 40.40.40.1, Broadcast: 40.40.40.3
VCI 1.400
```

```

Flags: Active
Total down time: 0 sec, Last down: Never
EPD threshold: 0, Transmit weight cells: 0
Input packets : 0
Output packets: 0
Logical interface at-2/2/0.32767 (Index 71) (SNMP ifIndex 27)
Flags: Point-To-Multipoint No-Multicast SNMP-Traps Encapsulation: ATM-VCMUX
Input packets : 0
Output packets: 0
VCI 1.4
Flags: Active
Total down time: 0 sec, Last down: Never
EPD threshold: 0, Transmit weight cells: 0
Input packets : 0
Output packets: 0

```

Meaning The first line of the sample output shows that the physical link and all logical links are up. This means that the interface can pass packets.

Further down the sample output, look for active alarms and defects. If there are any, and to further diagnose the problem, see [“Display Extensive Information for a Specific ATM2 Interface” on page 93](#) to display more extensive information about the ATM interface and the physical interface that is down.

Display Extensive Information for a Specific ATM2 Interface

Purpose To display extensive status information about a specific ATM2 interface, use the following Junos OS CLI operational mode command:

Action `user@host> show interfaces at-fpc/pic/port extensive`

Sample Output

```

user@host> show interfaces at-2/2/0 extensive
Physical interface: at-2/2/0, Enabled, Physical link is Up
Interface index: 138, SNMP ifIndex: 26, Generation: 21
Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed:
OC12, Loopback: None,
Payload scrambler: Enabled
Device flags   : Present Running
Link flags     : None
CoS queues     : 4 supported
Hold-times     : Up 0 ms, Down 0 ms
Current address: 00:90:69:d6:d5:3a
Last flapped   : 2004-05-03 14:32:52 UTC (02:42:30 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes :                0                0 bps
Output bytes :             1600                0 bps
Input packets:                0                0 pps
Output packets:             18                0 pps
Input errors:
Errors: 0, Drops: 0, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0,
L2 channel errors: 0, L2 mismatch timeouts: 0
Output errors:
Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
Queue counters:      Queued packets  Transmitted packets      Dropped packets

```

0 assured-forw	18	18	0
1 expedited-fo	0	0	0
2 best-effort	0	0	0
3 network-cont	0	0	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	1	13	
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	196	
REI-L	1	291	
RDI-L	0	0	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	1		
SES-LFE	0		
UAS-LFE	0		

SONET path:

BIP-B3	1	36	
REI-P	1	211	
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	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	: 0x13, C2(cmp)	: 0x13, F2	: 0x00
Z3	: 0x00, Z4	: 0x00, S1(cmp)	: 0x00	

Transmitted SONET overhead:

F1	: 0x00, J0	: 0x01, K1	: 0x00, K2	: 0x00
S1	: 0x00, C2	: 0x13, F2	: 0x00, Z3	: 0x00
Z4	: 0x00			

ATM status:

HCS state:	Sync
LOC	: OK

ATM Statistics:

```

Uncorrectable HCS errors: 177, Correctable HCS errors: 3, Tx cell FIFO
overruns: 0,
Rx cell FIFO overruns: 0, Rx cell FIFO underruns: 0, Input cell count: 4,
Output cell count: 13785683517, Output idle cell count: 0, Output VC queue
drops: 0,
Input no buffers: 0, Input length errors: 0, Input timeouts: 0, Input invalid
VCs: 2,
Input bad CRCs: 0, Input OAM cell no buffers: 0
Packet Forwarding Engine configuration:
Destination slot: 2
VPI 1
Flags: Active
Total down time: 0 sec, Last down: Never
Traffic statistics:
  Input bytes :          0
  Output bytes :         1600
  Input packets:          0
  Output packets:         18
Logical interface at-2/2/0.100 (Index 67) (SNMP ifIndex 36) (Generation 11)
Flags: Point-To-Multipoint SNMP-Traps Encapsulation: Ether-over-ATM-LLC
Traffic statistics:
  Input bytes :          0
  Output bytes :         896
  Input packets:          0
  Output packets:         7
Local statistics:
  Input bytes :          0
  Output bytes :         896
  Input packets:          0
  Output packets:         7
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: 17, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 172.16.5/24, Local: 172.16.5.1, Broadcast: 172.16.5.255,
Generation: 16
VCI 1.100
Flags: Active, Shaping, Multicast
VBR, Peak: 66kbps, Sustained: 66kbps, Burst size: 40
Total down time: 0 sec, Last down: Never
EPD threshold: 0, Transmit weight cells: 0
ATM per-VC transmit statistics:
Tail queue packet drops: 0
Traffic statistics:
  Input bytes :          0
  Output bytes :         1512
  Input packets:          0
  Output packets:         14
Logical interface at-2/2/0.101 (Index 68) (SNMP ifIndex 37) (Generation 12)
Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
Traffic statistics:
  Input bytes :          0
  Output bytes :         200
  Input packets:          0
  Output packets:         2
Local statistics:
  Input bytes :          0

```

```

Output bytes :                200
Input  packets:                0
Output packets:                2
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: 18, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 172.16.250.252/30, Local: 172.16.250.253, Broadcast:
172.16.250.255,
Generation: 18
VCI 1.101
Flags: Active
Total down time: 0 sec, Last down: Never
EPD threshold: 0, Transmit weight cells: 0
ATM per-VC transmit statistics:
Tail queue packet drops: 0
Traffic statistics:
Input  bytes :                0
Output bytes :               184
Input  packets:                0
Output packets:                2
Logical interface at-2/2/0.200 (Index 69) (SNMP ifIndex 8280) (Generation 13)
Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
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: 19, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 20.20.20.0/30, Local: 20.20.20.1, Broadcast: 20.20.20.3,
Generation: 20
VCI 1.200
Flags: Active
Total down time: 0 sec, Last down: Never
EPD threshold: 0, Transmit weight cells: 0
ATM per-VC transmit statistics:
Tail queue packet drops: 0
Traffic statistics:
Input  bytes :                0
Output bytes :                0
Input  packets:                0
Output packets:                0
Logical interface at-2/2/0.300 (Index 70) (SNMP ifIndex 8281) (Generation 14)
Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
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: 20, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 30.30.30.0/30, Local: 30.30.30.1, Broadcast: 30.30.30.3,
Generation: 22
VCI 1.300
Flags: Active
Total down time: 0 sec, Last down: Never
EPD threshold: 0, Transmit weight cells: 0
ATM per-VC transmit statistics:
Tail queue packet drops: 0
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Logical interface at-2/2/0.400 (Index 72) (SNMP ifIndex 8282) (Generation 15)
Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
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: 21, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 40.40.40.0/30, Local: 40.40.40.1, Broadcast: 40.40.40.3,
Generation: 24
VCI 1.400
Flags: Active
Total down time: 0 sec, Last down: Never
EPD threshold: 0, Transmit weight cells: 0
ATM per-VC transmit statistics:
Tail queue packet drops: 0
Traffic statistics:
Input bytes : 0
Output bytes : 0

```

```

        Input packets:                0
        Output packets:               0
Logical interface at-2/2/0.32767 (Index 71) (SNMP ifIndex 27) (Generation 9)
Flags: Point-To-Multipoint No-Multicast SNMP-Traps Encapsulation: ATM-VCMUX
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
VCI 1.4
Flags: Active
Total down time: 0 sec, Last down: Never
EPD threshold: 0, Transmit weight cells: 0
ATM per-VC transmit statistics:
    Tail queue packet drops: 0
Traffic statistics:
    Input bytes :                     0
    Output bytes :                     0
    Input packets:                    0
    Output packets:                   0

```

Meaning The sample output is for an OC12 ATM interface and shows the statistics for the SONET media, as well as the **Input** and **Output** ATM errors. Error details include input and output errors, active alarms and defects, and media-specific errors.

If the physical link is down, look at the active alarms and defects for the ATM interface and check the ATM media accordingly. See [“List of Common ATM Alarms and Error”](#) on [page 117](#) for an explanation of ATM alarms.

Monitor Statistics for an ATM2 Interface

Purpose To monitor statistics for an ATM2 interface, use the following Junos OS CLI operational mode command:

Action `user@host> monitor interface at-fpc/pic/port`



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.

Sample Output

```

user@host> monitor interface at-2/2/0
host                               Seconds: 5                               Time: 17:16:49
                                                                           Delay: 3/0/3

Interface: at-2/2/0, Enabled, Link is Up
Encapsulation: ATM-PVC, Speed: OC12
Traffic statistics:
    Input bytes:                     0 (0 bps)                               Current delta
                                                                           [0]

```



```

Output bytes:                1600 (0 bps)                [0]
Input packets:                0 (0 pps)                  [0]
Output packets:              18 (0 pps)                  [0]
Error statistics:
Input errors:                 0                          [0]
Input drops:                  0                          [0]
Input framing errors:         0                          [0]
Policed discards:             0                          [0]
L3 incompletes:               0                          [0]
L2 channel errors:            0                          [0]
L2 mismatch timeouts:         0                          [0]
Carrier transitions:           1                          [0]
Output errors:                 0                          [0]
Output drops:                  0                          [0]
Aged packets:                 0                          [0]
ATM statistics:
Input cell count               4                          [0]
Input invalid vc               2                          [0]
Output cell count              13908633088                 [8484369]
Output idle cell count         0                          [0]
Active alarms : NoneActive defects: NoneSONET error countsZ [0]

```

Meaning The sample output checks for and displays common interface failures and any increases in framing errors. Information from this command can help you 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.

- Related Documentation**
- [Checklist for Monitoring ATM Interfaces on page 85](#)
 - [Monitor ATM Interfaces on page 86](#)
 - [Monitor ATM1 Interfaces on page 87](#)

CHAPTER 11

Use Loopback Testing for ATM Interfaces

This chapter describes the steps for using loopback testing to isolate Asynchronous Transfer Mode (ATM) interface problems. The steps for loopback testing apply to both ATM1 and ATM2 intelligent queuing (IQ) interfaces.

- [Checklist for Using Loopback Testing for ATM Interfaces on page 101](#)
- [Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface on page 102](#)
- [Create a Loopback on page 103](#)
- [Set Clocking to Internal on page 105](#)
- [Verify That the ATM Interface Is Up on page 106](#)
- [Clear ATM Interface Statistics on page 109](#)
- [Ping the ATM Interface on page 109](#)
- [Check for ATM Interface Error Statistics on page 110](#)
- [Diagnose a Suspected Circuit Problem on page 114](#)

Checklist for Using Loopback Testing for ATM Interfaces

Purpose To use loopback testing for ATM interfaces.

Action [Table 24 on page 101](#) provides links and commands for using loopback testing for ATM interfaces.

Table 24: Checklist for Using Loopback Testing for ATM Interfaces

Tasks	Command or Action
“Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface” on page 102	
1. Create a Loopback on page 103	
a. Create a Physical Loopback on page 104	Connect the transmit port to the receive port.
b. Configure a Local Loopback on page 104	<pre>[edit interfaces <i>interface-name</i> (sonet-options t3-options)] set loopback local show commit</pre>

Table 24: Checklist for Using Loopback Testing for ATM Interfaces (*continued*)

Tasks	Command or Action
2. Set Clocking to Internal on page 105	<code>[edit interfaces <i>interface-name</i>] set clocking internal show commit</code>
3. Verify That the ATM Interface Is Up on page 106	<code>show interfaces at-<i>fpc/port/pic</i></code>
4. Clear ATM Interface Statistics on page 109	<code>clear interfaces statistics at-<i>fpc/port/pic</i></code>
5. Ping the ATM Interface on page 109	<code>ping interface at-<i>fpc/port/pic</i> local-IP-address bypass-routing count 1000 rapid</code>
6. Check for ATM Interface Error Statistics on page 110	<code>show interfaces at-<i>fpc/port/pic</i> extensive</code>
“Diagnose a Suspected Circuit Problem” on page 114	
1. Create a Loop from the Router to the Network on page 114	<code>[edit interfaces <i>interface-name</i> (sonet-options t3-options)] set loopback remote show commit</code>
2. Create a Loop to the Router from Various Points in the Network on page 115	Perform Steps 2 through 6 from “Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface” on page 102.

Related Documentation

- [Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface on page 102](#)
- [Create a Loopback on page 103](#)
- [Set Clocking to Internal on page 105](#)
- [Verify That the ATM Interface Is Up on page 106](#)
- [Clear ATM Interface Statistics on page 109](#)
- [Ping the ATM Interface on page 109](#)
- [Check for ATM Interface Error Statistics on page 110](#)
- [Diagnose a Suspected Circuit Problem on page 114](#)

Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface

Problem When you suspect a hardware problem, perform the following steps to verify if there is a hardware problem.

Solution To diagnose a suspected hardware problem with an ATM1 or ATM2 IQ interface, follow these steps:

1. [Create a Loopback on page 103](#)
2. [Set Clocking to Internal on page 105](#)
3. [Verify That the ATM Interface Is Up on page 106](#)
4. [Clear ATM Interface Statistics on page 109](#)
5. [Ping the ATM Interface on page 109](#)
6. [Check for ATM Interface Error Statistics on page 110](#)

Related Documentation

- [Checklist for Using Loopback Testing for ATM Interfaces on page 101](#)
- [Create a Loopback on page 103](#)
- [Set Clocking to Internal on page 105](#)
- [Verify That the ATM Interface Is Up on page 106](#)
- [Clear ATM Interface Statistics on page 109](#)
- [Ping the ATM Interface on page 109](#)
- [Check for ATM Interface Error Statistics on page 110](#)
- [Diagnose a Suspected Circuit Problem on page 114](#)

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 transmit and receive ports.

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).

- [Create a Physical Loopback on page 104](#)
- [Configure a Local Loopback on page 104](#)

Create a Physical Loopback

Create a physical loopback from the transmit port to the receive port.



NOTE: Make sure you use single-mode fiber for a single-mode port and multimode fiber for a multimode port for SONET media.

1. To create a physical loopback at the port, connect the transmit port to the receive port using a known good cable.

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

Purpose Because ATM interfaces can be either SONET or T3, you use the **sonet-options** or **t3-options** statements to configure a local loopback. [Figure 9 on page 104](#) illustrates a local loopback configured for an ATM interface.

Figure 9: Local Loopback



Action To configure a local loopback without physically connecting the transmit port to the receive port, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces interface-name (sonet-options | t3-options)
```

2. Configure the loopback:

```
[edit interfaces interface-name (sonet-options | t3-options)]
user@host# set loopback local
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces (t3-1/0/0 t3-options)]
user@host# show
loopback local;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0 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.

Related Documentation

- [Checklist for Using Loopback Testing for ATM Interfaces on page 101](#)
- [Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface on page 102](#)
- [Set Clocking to Internal on page 105](#)
- [Verify That the ATM Interface Is Up on page 106](#)
- [Clear ATM Interface Statistics on page 109](#)
- [Ping the ATM Interface on page 109](#)
- [Check for ATM Interface Error Statistics on page 110](#)
- [Diagnose a Suspected Circuit Problem on page 114](#)

Set Clocking to Internal

Purpose Clocking is set to internal because there is no external clock source in a loopback connection.

Action To configure clocking to internal, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces interface-name
```

2. Configure the clocking to internal:

```
user@host# set clocking internal
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t3-1/0/0]
user@host# show
clocking internal;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0]
user@host# commit
commit complete
```

Meaning The clock source for the interface is set to the internal Stratum 3 clock.

Related Documentation

- [Checklist for Using Loopback Testing for ATM Interfaces on page 101](#)
- [Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface on page 102](#)
- [Create a Loopback on page 103](#)
- [Verify That the ATM Interface Is Up on page 106](#)
- [Clear ATM Interface Statistics on page 109](#)
- [Ping the ATM Interface on page 109](#)
- [Check for ATM Interface Error Statistics on page 110](#)
- [Diagnose a Suspected Circuit Problem on page 114](#)

Verify That the ATM Interface Is Up

Purpose Displaying the status of the ATM interface provides the information you need to determine whether the physical link is up or down.

Action To verify that the status of the ATM interface is up, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces at-fpc/pic/port
```

Sample Output 1 The following sample output is for an OC3 ATM interface:

```
user@host> show interfaces at-2/0/0
Physical interface: at-2/0/0, Enabled, Physical link is Up
  Interface index: 22, SNMP ifIndex: 42
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed:
OC3 , Loopback: Local, Payload scrambler: Enabled
  Device flags : Present Running
  Link flags    : None
  Input rate    : 0 bps (0 pps)
  Output rate   : 0 bps (0 pps)
  SONET alarms : None
  SONET defects : None
  Logical interface at-2/0/0.0 (Index 29) (SNMP ifIndex 49)
    Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
  Input packets : 0
  Output packets: 0
    Protocol inet, MTU: 4470, Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.168.1.0/30, Local: 192.168.1.1
    VCI 1.100
      Flags: Active
      Total down time: 0 sec, Last down: Never
```



```

Traffic statistics:
  Input  packets:          0
  Output packets:          0

```

Sample Output 2 The following sample output is for a T3 ATM interface:

```

user@host> show interfaces at-0/1/0
Physical interface: at-0/1/0, Enabled, Physical link is Up
  Interface index: 90, SNMP ifIndex: 18
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, Speed: T3 , Loopback:
None, Payload scrambler: Enabled,
  Mode: C/Bit parity, Line buildout: 10, ATM Encapsulation: PLCP
  Device flags : Present Running
  Link flags   : None
  Current address: 00:90:69:0c:c0:1f
  Last flapped  : 2002-08-14 16:25:07 UTC (00:00:42 ago)
  Input rate    : 0 bps (0 pps)
  Output rate   : 0 bps (0 pps)
  Active alarms : None
  Active defects: None

```

Sample Output 3 The following sample output is for an OC3 ATM interface:

```

user@host> show interfaces at-2/0/1
Physical interface: at-2/0/1, Enabled, Physical link is Down
  Interface index: 23, SNMP ifIndex: 43
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed:
OC3 , Loopback: None, Payload scrambler: Enabled
  Device flags : Present Running Down
  Link flags   : None
  Input rate    : 0 bps (0 pps)
  Output rate   : 0 bps (0 pps)
  SONET alarms : LOL, LOS
  SONET defects: LOL, LOF, LOS, SEF, AIS-L, AIS-P, RDI-P, PLM-P
  Logical interface at-2/0/1.10 (Index 30) (SNMP ifIndex 65)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
    Input packets : 0
    Output packets: 0
    Protocol inet, MTU: 4470, Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 192.168.100.0/30, Local: 192.168.100.1
    VCI 2.100
      Flags: Active
      Total down time: 0 sec, Last down: Never
  Traffic statistics:
    Input  packets:          0
    Output packets:          0

```

Sample Output 4 The following sample output is for a T3 ATM interface:

```

user@host> show interfaces at-0/1/0
Physical interface: at-0/1/0, Enabled, Physical link is Down
  Interface index: 90, SNMP ifIndex: 18
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, Speed: T3 , Loopback:
None, Payload scrambler: Enabled,
  Mode: C/Bit parity, Line buildout: 10, ATM Encapsulation: PLCP
  Device flags : Present Running Down
  Link flags   : None
  Current address: 00:90:69:0c:c0:1f
  Last flapped  : 2002-08-09 11:36:15 UTC (5d 04:14 ago)

```

```

Input rate      : 0 bps (0 pps)
Output rate     : 0 bps (0 pps)
Active alarms   : PLL, LOF, LOS
Active defects  : PLL, LOF, LOS

```

Meaning Sample output 1 shows that the physical link is up and there are no SONET alarms or defects.

Sample output 2 shows that the physical link is up and there are no active alarms or defects.

Sample output 3 shows that the physical link, the device flags, and interface flags are down, and that there are SONET alarms and defects. When you see that the physical link is down, there may be a problem with the port.

Sample output 4 shows that the physical link, the device flags, and interface flags are down, and that there are active alarms and defects. When you see that the physical link is down, there may be a problem with the port.

For more information about problem situations and actions to take for a physical link that is down, see [Table 25 on page 108](#).

Table 25: Problems and Solutions for a Physical Link That Is Down

Problem	Actions
Cable mismatch	Verify that the cable connection is correct.
Damaged fiber or coax cable or dirty fiber cable	Verify that the cable can successfully loop a known good port of the same type.
Too much or too little optical attenuation (for an OC3 or OC12 ATM interface)	Verify that the attenuation is correct per the PIC optical specification.
The transmit port is not transmitting within the dBm optical range per the specifications (for an OC3 or OC12 ATM interface)	Verify that the Tx power of the optics is within range of the PIC optical specification.

Related Documentation

- [Checklist for Using Loopback Testing for ATM Interfaces on page 101](#)
- [Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface on page 102](#)
- [Create a Loopback on page 103](#)
- [Set Clocking to Internal on page 105](#)
- [Clear ATM Interface Statistics on page 109](#)
- [Ping the ATM Interface on page 109](#)
- [Check for ATM Interface Error Statistics on page 110](#)

Purpose	You must reset ATM interface statistics before you initiate 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 investigation.
Action	To clear all statistics for the interface, use the following Junos OS CLI operational mode command: <pre>user@host> clear interfaces statistics at-fpc/pic/port</pre>
Sample Output	<pre>user@host> clear interfaces statistics at-4/0/2 user@host></pre>
Meaning	This command clears the interface statistics counters for interface at-4/0/2 only.
Related Documentation	<ul style="list-style-type: none"> • Checklist for Using Loopback Testing for ATM Interfaces on page 101 • Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface on page 102 • Create a Loopback on page 103 • Set Clocking to Internal on page 105 • Verify That the ATM Interface Is Up on page 106 • Ping the ATM Interface on page 109 • Check for ATM Interface Error Statistics on page 110 • Diagnose a Suspected Circuit Problem on page 114

[illegible]

1000 packets transmitted, 1000 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.423/0.740/26.822/0.829 ms

Meaning This command sends 1000 ping packets out of the interface to the local IP address. The ping should complete successfully with no packet loss. If there is any persistent packet loss, open a case with the Juniper Networks Technical Assistance Center (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).

- Related Documentation**
- [Checklist for Using Loopback Testing for ATM Interfaces on page 101](#)
 - [Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface on page 102](#)
 - [Create a Loopback on page 103](#)
 - [Set Clocking to Internal on page 105](#)
 - [Verify That the ATM Interface Is Up on page 106](#)
 - [Clear ATM Interface Statistics on page 109](#)
 - [Check for ATM Interface Error Statistics on page 110](#)
 - [Diagnose a Suspected Circuit Problem on page 114](#)

Check for ATM Interface Error Statistics

Purpose Persistent interface error statistics indicate that you need to open a case with JTAC.

Action To check the local interface for error statistics, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces at-fpc/pic/port extensive
```

Sample Output The following sample output is for an OC3 ATM interface:

```
user@host> show interfaces at-2/0/0 extensive
Physical interface: at-2/0/0, Enabled, Physical link is Up
Interface index: 22, SNMP ifIndex: 42, Generation: 21
Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed:
OC3 , Loopback: None, Payload scrambler: Enabled
Device flags   : Present Running
Link flags     : None
Hold-times    : Up 0 ms, Down 0 ms
Statistics last cleared: 2002-07-29 14:28:14 EDT (00:00:26 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, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0,
L2 mismatch timeouts: 0
Output errors:
Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 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         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
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 : 0x13, C2(cmp) : 0x13, 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 : 0x13, F2 : 0x00, Z3 : 0x00
  Z4 : 0x00, V5 : 0x00
ATM status:
  HCS state: Sync
  LOC : OK
ATM Statistics:
  Uncorrectable HCS errors: 0, Correctable HCS errors: 0, Tx cell FIFO overruns:
0, Rx cell FIFO overruns: 0,
  Rx cell FIFO underruns: 0, Input cell count: 0, Output cell count: 8830024,
Output idle cell count: 8830026,
  Output VC queue drops: 0, Input no buffers: 0, Input length errors: 0, Input
timeouts: 0, Input invalid VCs: 0,
  Input bad CRCs: 0, Input OAM cell no buffers: 0
PFE configuration:
  Destination slot: 2

```

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 at-2/0/0.0 (Index 29) (SNMP ifIndex 49) (Generation 28)
Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
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, Flags: None, Generation: 31 Route table: 0
Addresses, Flags: Is-Preferred Is-Primary
Destination: 192.168.1.0/30, Local: 192.168.1.1, Broadcast: Unspecified,
Generation: 59
VCI 1.100
Flags: Active
Total down time: 0 sec, Last down: Never
ATM per-VC transmit statistics:
Tail queue packet drops: 0
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0

Sample Output The following sample output is for a T3 ATM interface:

```

user@host> show interfaces at-0/1/0 extensive
Physical interface: at-0/1/0, Enabled, Physical link is Up
Interface index: 90, SNMP ifIndex: 18, Generation: 89
Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, Speed: T3 , Loopback:
None, Payload scrambler: Enabled,
Mode: C/Bit parity, Line buildout: 10, ATM Encapsulation: PLCP
Device flags : Present Running
Link flags : None
Hold-times : Up 0 ms, Down 0 ms
Current address: 00:90:69:0c:c0:1f
Last flapped : 2002-08-14 16:25:07 UTC (00:00:21 ago)
Statistics last cleared: 2002-08-14 16:25:26 UTC (00:00:02 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, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0,
L2 mismatch timeouts: 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
  YELLOW        0      0 OK
  EXZ           0      0
  LCV           0      0
  PCV           0      0
  FERR          0      0
  LES           0
  PES           0
  PSES          0
  SEFS          0
  UAS           0
PLCP defects:
  Seconds      Count  State
  LOF          0      0
  YELLOW       0      0
ATM defects:
  Seconds      Count  State
  LCD          0      0
ATM status:
  HCS state:    Sync
  LOC :         OK
PLCP statistics (errored seconds):
  Framing errors      : 0(0)
  Bit interleaved parity errors: 0(0)
  Far end block errors : 0(0)
ATM Statistics:
  Uncorrectable HCS errors: 0, Correctable HCS errors: 0, Tx cell FIFO overruns:
0, Rx cell FIFO overruns: 0,
  Rx cell FIFO underruns: 0, Input cell count: 0, Output cell count: 96041,
Output idle cell count: 96040,
  Output VC queue drops: 0, Input no buffers: 0, Input length errors: 0, Input
timeouts: 0, Input invalid VCs: 0,
  Input bad CRCs: 0, Input OAM cell no buffers: 0
Packet Forwarding Engine configuration:
  Destination slot: 0
  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 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 the 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).

Related Documentation

- [Checklist for Using Loopback Testing for ATM Interfaces on page 101](#)
- [Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface on page 102](#)
- [Create a Loopback on page 103](#)

- [Set Clocking to Internal on page 105](#)
- [Verify That the ATM Interface Is Up on page 106](#)
- [Clear ATM Interface Statistics on page 109](#)
- [Ping the ATM Interface on page 109](#)
- [Diagnose a Suspected Circuit Problem on page 114](#)

Diagnose a Suspected Circuit Problem

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.

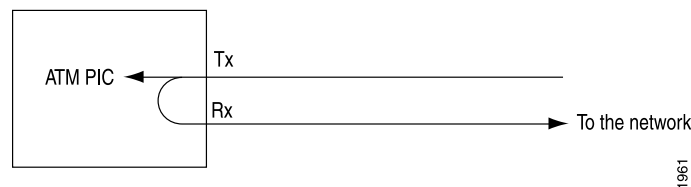
To diagnose a suspected circuit problem, follow these steps:

1. [Create a Loop from the Router to the Network on page 114](#)
2. [Create a Loop to the Router from Various Points in the Network on page 115](#)

Create a Loop from the Router to the Network

Purpose Creating a loop from the router to the network allows the transport-layer engineer to test the router from various points in the network. This helps the engineer isolate where the problem might be located. [Figure 10 on page 114](#) illustrates a loop from a router to the network.

Figure 10: Loop from the Router to the Network



Action To create a loop from the router to the network, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces interface-name (sonet-options | t3-options)
```
2. Configure the remote loopback:

```
[edit interfaces interface-name (sonet-options | t3-options)]
user@host# set loopback remote
```
3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t3-1/0/0 t3-options]
```



```
user@host# show
loopback remote;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0 t3-options]
user@host# commit
commit complete
```

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 6 in [“Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface” on page 102](#). 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**

- [Checklist for Using Loopback Testing for ATM Interfaces on page 101](#)
- [Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface on page 102](#)
- [Create a Loopback on page 103](#)
- [Set Clocking to Internal on page 105](#)
- [Verify That the ATM Interface Is Up on page 106](#)
- [Clear ATM Interface Statistics on page 109](#)
- [Ping the ATM Interface on page 109](#)
- [Check for ATM Interface Error Statistics on page 110](#)

CHAPTER 12

Locate ATM Alarms and Errors

This chapter describes the most common Asynchronous Transfer Mode (ATM) alarms and errors on both ATM1 and ATM2 intelligent queuing (IQ) interfaces that you can encounter on a Juniper Networks router.

- [List of Common ATM Alarms and Error on page 117](#)
- [Display ATM1 and ATM2 Alarms and Errors on page 117](#)

List of Common ATM Alarms and Error

Purpose	To check Asynchronous Transfer Mode (ATM) alarms and errors on both ATM1 and ATM2 IQ interfaces.
Action	Table 26 on page 117 provides links and commands for checking ATM alarms and errors.

Table 26: List of Common ATM Alarms and Error

Tasks	Command or Action
“Display ATM1 and ATM2 Alarms and Errors” on page 117	<code>show interfaces at-<i>fpc/pic/port</i> extensive</code> See “List of Common SONET Alarms and Errors” on page 149. See “Checklist of Common T3 Alarms and Errors” on page 67.

Related Documentation	<ul style="list-style-type: none">• Display ATM1 and ATM2 Alarms and Errors on page 117
------------------------------	-----------------------------------------------------------------------------------------------------------------------

Display ATM1 and ATM2 Alarms and Errors

Purpose	The alarms and errors that appear on an ATM1 or an ATM2 IQ interface are identical. ATM alarms and errors are dependent on the ATM interface media. If the ATM interface is an OC3 or OC12 interface media, the media statistics are SONET statistics. If the ATM interface is a T3 interface media, the media statistics are T3 statistics. For information on determining the type of ATM interface on your router, see “Checklist for Determining ATM Interface Type” on page 75.
----------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Action To display ATM alarms and errors, use the following Junos OS command-line interface (CLI) operational mode command:

```
user@host>show interfaces at-fpc/pic/port extensive
```

Sample Output 1

```
user@host> show interfaces at-2/0/0 extensive
Physical interface: at-2/0/0, Enabled, Physical link is Up
Interface index: 22, SNMP ifIndex: 42, Generation: 21
Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed:
OC3 , Loopback: None, Payload scrambler: Enabled
Device flags   : Present Running
Link flags     : None
Hold-times    : Up 0 ms, Down 0 ms
Statistics last cleared: 2002-07-29 14:28:14 EDT (00:00:26 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, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0,
L2 mismatch timeouts: 0
Output errors:
Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 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           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
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      : 0x13, C2(cmp) : 0x13, 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      : 0x13, F2      : 0x00, Z3      : 0x00
Z4      : 0x00, V5      : 0x00
ATM status:
HCS state:      Sync
LOC      :      OK
ATM Statistics:
Uncorrectable HCS errors: 0, Correctable HCS errors: 0, Tx cell FIFO overruns:
0, Rx cell FIFO overruns: 0,
Rx cell FIFO underruns: 0, Input cell count: 0, Output cell count: 8830024,
Output idle cell count: 8830026,
Output VC queue drops: 0, Input no buffers: 0, Input length errors: 0, Input
timeouts: 0, Input invalid VCs: 0,
Input bad CRCs: 0, Input OAM cell no buffers: 0
PFE configuration:
Destination slot: 2
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 at-2/0/0.0 (Index 29) (SNMP ifIndex 49) (Generation 28)
Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
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, Flags: None, Generation: 31 Route table: 0
Addresses, Flags: Is-Preferred Is-Primary
Destination: 192.168.1.0/30, Local: 192.168.1.1, Broadcast: Unspecified,
Generation: 59
VCI 1.100
Flags: Active
Total down time: 0 sec, Last down: Never
ATM per-VC transmit statistics:
Tail queue packet drops: 0
Traffic statistics:
Input bytes :      0
Output bytes :      0

```

```

Input  packets:          0
Output packets:          0

```

Meaning Sample output 1 shows the error statistics for an OC3 ATM interface. SONET alarms and errors fall into three different areas of the output: section, line, and path. See [“List of Common SONET Alarms and Errors” on page 149](#) for information on SONET alarms.

Sample Output 2

```

user@host> show interfaces at-3/1/0 extensive
Physical interface: at-3/1/0, Enabled, Physical link is Up
  Interface index: 57, SNMP ifIndex: 66, Generation: 56
  Description: customer
  Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, Speed: T3 , Loopback:
  None,
  Payload scrambler: Disabled, Mode: C/Bit parity, Line build-out: 10, ATM
  Encapsulation: PLCP
  Device flags   : Present Running
  Link flags     : None
  Hold-times    : Up 0 ms, Down 0 ms
  Statistics last cleared: 2002-07-30 15:36:58 UTC (00:00:02 ago)
  Traffic statistics:
    Input bytes  :                270798                1067704 bps
    Output bytes :                2260295                8911952 bps
    Input packets:                2001                986 pps
    Output packets:                2506                1235 pps
  Input errors:
    Errors: 0, Drops: 0, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,
    L3 incompletes: 0,
    L2 channel errors: 0, L2 mismatch timeouts: 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
    YELLOW       0       0 OK
    EXZ          0       0
    LCV          0       0
    PCV          0       0
    FERR         0       0
    LES          0
    PES          0
    PSES         0
    SEFS         0
    UAS          0
  PLCP defects:
    Seconds      Count  State
    LOF          0       0
    YELLOW       0       0
  ATM defects:
    Seconds      Count  State
    LCD          0       0
  ATM status:
    HCS state:    Hunt
    LOC          :    OK
  PLCP statistics (errored seconds):
    Framing errors      : 0(0)
    Bit interleaved parity errors: 0(0)
    Far end block errors : 0(0)

```

```

ATM Statistics:
  Uncorrectable HCS errors: 0, Correctable HCS errors: 0, Tx cell FIFO overruns:
0,
  Rx cell FIFO overruns: 0, Rx cell FIFO underruns: 0, Input cell count: 7716,

  Output cell count: 191980, Output idle cell count: 144302, Output VC queue
drops: 0,
  Input no buffers: 0, Input length errors: 0, Input timeouts: 0, Input invalid
VCs: 0,
  Input bad CRCs: 0, Input OAM cell no buffers: 0
PFE configuration:
  Destination slot: 3
  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 at-3/1/0.0 (Index 25) (SNMP ifIndex 85) (Generation 44)
Flags: Point-To-Point Inverse-ARP SNMP-Traps Encapsulation: ATM-SNAP
Traffic statistics:
  Input bytes :          270798
  Output bytes :         2260295
  Input packets:          2001
  Output packets:         2506
Local statistics:
  Input bytes :          0
  Output bytes :          0
  Input packets:          0
  Output packets:         0
Transit statistics:
  Input bytes :          270798          1067704 bps
  Output bytes :         2260295          8911952 bps
  Input packets:          2001           986 pps
  Output packets:         2506          1235 pps
Protocol inet, MTU: 4470, Flags: None, Generation: 51 Route table: 0
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.10.65.176/30, Local: 10.10.65.177, Broadcast: Unspecified,
Generation: 88
  VCI 0.5
    Flags: Active, Inverse-ARP
    Total down time: 0 sec, Last down: Never
  ATM per-VC transmit statistics:
    Tail queue packet drops: 0
  Traffic statistics:
    Input bytes :          270798
    Output bytes :         2260295
    Input packets:          2001
    Output packets:         2506

```

Meaning

Sample output 2 shows the error statistics for a T3 ATM interface. See [“Checklist of Common T3 Alarms and Errors” on page 67](#) for information on T3 alarms.

[Table 27 on page 122](#) describes the input and output errors that appear in the extensive output for an ATM interface.

Table 27: ATM Interface Input and Output Errors

Error	Description	Reason for Error
Input Errors		
Errors	Sum of the incoming frame aborts and frame check sequence (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 random early detection (RED) mechanism.
Invalid VCs	Number of cells that arrived for a nonexistent virtual circuit (VC).	
Framing errors	Sum of ATM Adaptation Layer (AAL5) packets that have FCS errors, AAL5 packets that have reassembly timeout errors, and AAL5 packets that have length errors.	
Policed discards	Frames that the incoming packet match code discarded because they were not recognized or of interest.	Usually, this field reports protocols that the Junos OS does not handle.
L3 incompletes	Number of packets discarded due to the packets failing Layer 3 header checks.	Increments when the incoming packet fails Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header would be discarded and this counter would increment.
L2 channel errors	Errors that occurred when the software could not find a valid logical interface for an incoming frame.	This counter increments when the software cannot find a valid logical interface for an incoming frame.
L2 mismatch timeouts	Count of malformed or short packets.	Count of malformed or short packets that cause the incoming packet handler to discard the frame as unreadable.
Output Errors		
Carrier transitions	Number of times the interface went from down to up.	This number should not increment quickly and should increase only when the cable is unplugged, the far-end system is powered down and up, or a similar problem occurs. If it increments quickly (perhaps once every 10 seconds), then the cable, the far-end system, or the Physical Interface Card (PIC) is broken.
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 for 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 broken hardware.

Table 28 on page 123 lists ATM media-specific alarms and 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 trigger the red or yellow alarm LED on the craft interface. For complete explanations of most of these alarms and defects, see Chapter 6 in *GR-253, Synchronous Optical Network (SONET) Transport Systems: Common Generic Criteria*.

Table 28: ATM Active Alarms and Defects

Alarm	Description
AIS	Alarm indication signal
AIS-L	Alarm indication signal (line)
AIS-P	Alarm indication signal (path)
BERR	Bit error rate
BERR-SD	Bit error rate defect—signal degrade
BERR-SF	Bit error rate fault—signal fail
EXZ	Excessive zeros
FERF	Far end receive failures
IDLE	Idle code detected
LCD	Loss of cell delineation
LCV	Line code violation
LOC	Loss of cell delineation
LOF	Loss of frame
LOL	Loss of light
LOP	Loss of pointer
LOS	Loss of signal
PLL	Phase-locked loop out of lock
PLCP_LOF	Loss of PLCP frame alarm
PLCP_YLW PLCP	Alarm at the remote end
PLM-P	Payload label mismatch

Table 28: ATM Active Alarms and Defects (*continued*)

Alarm	Description
RDI	Remote defect indication
RDI-L	Remote defect indication (line)
RDI-P	Remote defect indication (path)
REI	Remote error indication
SEF	Severely errored frame
UNEQ	Unequipped
YLW	Remote defect indication (yellow alarm)

Related Documentation

- [List of Common ATM Alarms and Error on page 117](#)

PART 5

Investigate SONET Interfaces

- [Monitor SONET Interfaces on page 127](#)
- [Use Loopback Testing for SONET Interfaces on page 135](#)
- [Locate SONET Alarms and Errors on page 149](#)
- [Enable SONET Payload Scrambling on page 173](#)
- [Check the SONET Frame Checksum on page 177](#)

CHAPTER 13

Monitor SONET Interfaces

This chapter describes how to monitor SONET interfaces and begin the process of isolating SONET interface problems when they occur.

- [Checklist for Monitoring SONET Interfaces on page 127](#)
- [Monitor SONET Interfaces on page 127](#)

Checklist for Monitoring SONET Interfaces

Purpose To monitor SONET interfaces and begin the process of isolating SONET interface problems when they occur.

Action [Table 29 on page 127](#) provides the links and commands for monitoring SONET interfaces.

Table 29: Checklist for Monitoring SONET Interfaces

Tasks	Command or Action
“Monitor SONET Interfaces” on page 127	
1. Display the Status of SONET Interfaces on page 128	show interfaces terse so*
2. Display the Status of a Specific SONET Interface on page 128	show interfaces so-fpc/pic/port
3. Display Extensive Status Information for a Specific SONET Interface on page 130	show interfaces so-fpc/pic/port extensive
4. Monitor Statistics for a SONET Interface on page 131	monitor interface so-fpc/pic/port

Monitor SONET Interfaces

By monitoring SONET interfaces, you begin the process of isolating SONET interface problems when they occur.

To monitor your SONET interface, follow these steps:

1. [Display the Status of SONET Interfaces on page 128](#)
2. [Display the Status of a Specific SONET Interface on page 128](#)

3. [Display Extensive Status Information for a Specific SONET Interface on page 130](#)
4. [Monitor Statistics for a SONET Interface on page 131](#)

Display the Status of SONET Interfaces

Purpose To display the status of SONET interfaces, use the following Junos OS command-line interface (CLI) operational mode command:

Action `user@host> show interfaces terse so*`

Meaning The sample output lists only the SONET interfaces. It shows the status of both the physical and logical interfaces.

For a description of what the output means, see [Table 30 on page 128](#).

Table 30: Status of SONET Interfaces

Physical Interface	Logical Interface	Status Description
so-1/0/0	so-1/0/0.0	This interface has both the physical and logical links up and running.
Admin Up	Admin Up	
Link Up	Link Up	
so-1/1/1	so-1/1/1.0	This interface is administratively disabled. The physical link is healthy (Link Up), but the logical link is not established end to end (Link Down).
Admin Down	Admin Up	
Link Up	Link Down	
so-3/0/1	so-3/0/1.0	This interface is administratively enabled and the physical link is healthy (Link Up), but the logical interface is not established end to end (Link Down).
Admin Up	Admin Up	
Link Up	Link Down	
so-5/3/0	so-5/3/0.0	This interface has the physical link down and the logical interface is down also.
Admin Up	Admin Up	
Link Down	Link Down	

Display the Status of a Specific SONET Interface

Purpose To display the status of a specific SONET interface when you need to investigate its status further, use the following Junos OS CLI operational mode command:

Action `user@host> show interfaces so-fpc/pic/port`

Sample Output The following sample output is for an interface with the physical link down:

```
user@router> show interfaces so-1/1/1
Physical interface: so-1/1/1, Enabled, Physical link is Down
```

```

Interface index: 17, SNMP ifIndex: 16
Description: router-02 pos 4/0
Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal, SONET mode
Speed: OC3, Loopback: None, CRC: 32, Payload scrambler: Enabled
Device flags : Present Running Down
Interface flags: Hardware-Down Link-Layer-Down Point-To-Point SNMP-Traps
Link flags : Keepalives
Keepalive Input: 621 (00:02:57 ago), Output: 889 (00:00:09 ago)
Input rate : 0 bps (0 pps), Output rate: 0 bps (0 pps)
Active alarms : LOL, LOS
Active defects: LOL, LOF, LOS, SEF, AIS-L, AIS-P, PLM-P
Logical interface so-1/1/1.0 (Index 18) (SNMP ifIndex 30)
Description: router-02 pos 4/0
Flags: Device-down Point-To-Point SNMP-Traps, Encapsulation: Cisco-HDLC
Protocol inet, MTU: 4470
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 10.10.10.48/30, Local: 10.10.10.50
Protocol iso, MTU: 4469

```

Meaning The first line of the sample output shows that the physical link is down. This means that the physical link is unhealthy and cannot pass packets. Further down the sample output, look for active alarms and defects. When you see this situation, to further diagnose the problem, see [“Display Extensive Status Information for a Specific SONET Interface” on page 130](#) to display more extensive information about the SONET interface and the physical interface that is down.

Sample Output The following output is for an interface with the physical layer up and the link layer down:

```

user@router> show interfaces so-3/0/1
Physical interface: so-3/0/1, Enabled, Physical link is Up
Interface index: 28, SNMP ifIndex: 55
Description: Customer ABC
Link-level type: Cisco-HDLC, 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
Link flags : Keepalives
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive: Input: 113 (00:00:02 ago), Output: 119 (00:00:02 ago)
Input rate : 80 bps (0 pps)
Output rate : 88 bps (0 pps)
SONET alarms : None
SONET defects : None
Logical interface so-3/0/1.0 (Index 22) (SNMP ifIndex 56)
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: 192.168.2.124/30, Local: 192.168.2.125

```

Meaning The sample output shows that the link layer is down. This means that the logical interface is not established end to end. When you see this situation, to further diagnose the problem, see [“Monitor Statistics for a SONET Interface” on page 131](#) to monitor statistics for the SONET interface and the logical interface that is down.

Display Extensive Status Information for a Specific SONET Interface

Purpose To display extensive status information about a specific interface, use the following Junos OS CLI operational mode command:

Action `user@host> show interfaces so-fpc/pic/port extensive`

Sample Output

```

user@router> show interfaces so-1/1/1 extensive
Physical interface: so-1/1/1, Enabled, Physical link is Down
Interface index: 17, SNMP ifIndex: 16
Description: router-02 pos 4/0
Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal, SONET mode
Speed: OC3, Loopback: None, CRC: 32, Payload scrambler: Enabled
Device flags : Present Running Down
Interface flags: Hardware-Down Link-Layer-Down Point-To-Point SNMP-Traps
Link flags : Keepalives
Keepalive statistics:
  Input : 621 (last seen 00:05:35 ago)
  Output: 905 (last seen 00:00:07 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes :          378736540          0 bps
  Output bytes :          6786356          0 bps
  Input packets:          225924          0 pps
  Output packets:         104798          0 pps
Input errors:
  Errors: 8, Drops: 0, Framing errors: 4181286, Runts: 0, Giants: 8
  Policed discards: 9474, L3 incompletes: 0, L2 channel errors: 0
  L2 mismatch timeouts: 3, HS link CRC errors: 0, HS link FIFO overflows: 0
Output errors:
  Carrier transitions: 2, Errors: 0, Drops: 0, Aged packets: 0
  HS link FIFO underflows: 0
Active alarms : LOL, LOS <-- SONET active alarms and defects
Active defects: LOL, LOF, LOS, SEF, AIS-L, AIS-P, PLM-P
SONET PHY:          Seconds          Count State <-- SONET media-specific
errors
  PLL Lock          0          0 OK
  PHY Light         328          1 Light Missing
SONET section: <-- SONET section errors
  BIP-B1            0          0
  SEF               329          3 Defect Active
  LOS               329          2 Defect Active
  LOF               329          2 Defect Active
  ES-S              329
  SES-S             329
  SEFS-S            329
SONET line:
  BIP-B2            0          0
  REI-L             0          0
  RDI-L             0          0 OK
  AIS-L             328          1 Defect Active
  BERR-SF           0          0 OK
  BERR-SD           0          0 OK
  ES-L              329
  SES-L             329
  UAS-L             318
  ES-LFE            0
  SES-LFE           0
  UAS-LFE           0
SONET path:

```



```

BIP-B3                0          0
REI-P                 0          0
LOP-P                 1          1 OK
AIS-P                 328        1 Defect Active
RDI-P                 0          0 OK
UNEQ-P                0          0 OK
PLM-P                 328        1 Defect Active
ES-P                  329
SES-P                  329
UAS-P                  318
ES-PFE                 0
SES-PFE                 0
UAS-PFE                 0
[...Output truncated...]

```

Meaning The sample output details where the errors might be occurring. Error details include input and output errors, active alarms and defects, and media-specific errors. The SONET section, line, and path errors help narrow down the source of the problem.

If the physical link is down, look at the active alarms and defects for the SONET interface and troubleshoot the SONET media accordingly. See [“List of Common SONET Alarms and Errors” on page 149](#) for an explanation of SONET alarms.

Monitor Statistics for a SONET Interface

Purpose To monitor statistics for a SONET interface, use the following Junos OS CLI operational mode command:

Action `user@host> monitor interface so-fpc/pic/port`



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.

Sample Output

```

user@router> monitor interface so-1/1/1
router                               Seconds: 168                Time: 15:48:50
Interface: so-1/1/1, Enabled, Link is Down
Encapsulation: Cisco-HDLC, Keepalives, Speed: OC3
Traffic statistics:
  Input bytes:                375527568 (0 bps)                [0]
  Output bytes:               6612857 (0 bps)                [475]
  Input packets:              224001 (0 pps)                 [0]
  Output packets:             102090 (0 pps)                 [20]
Encapsulation statistics:
  Input keepalives:           0                               [0]
  Output keepalives:          176                             [17]
Error statistics:
  Input errors:                0                               [0]
  Input drops:                 0                               [0]
  Input framing errors:       179                             [17]
  Policed discards:           47                               [0]
  L3 incompletes:              0                               [0]
  L2 channel errors:          0                               [0]
  L2 mismatch timeouts:       0                               [0]

```

```

Carrier transitions:                1                [0]
Output errors:                     0                [0]
Output drops:                      0                [0]
F2      : 0x00  Z3      : 0x00  Z4      : 0x00
Interface warnings:
  o Received keepalive count is zero
  o Framing errors are increasing, check FCS configuration and link
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'

```

Meaning This output checks for and displays common interface failures, whether or not loopback is detected, and any increases in framing errors. Information from this command can help you 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.

The statistics in the second column are the cumulative statistics since the last time they were cleared using the `clear interfaces statistics interface-name` command. The statistics in the third column are the statistics since the `monitor interface interface-name` command was executed.

If the framing errors are increasing, verify that the frame check sequence (FCS) and scrambling configuration match on both ends of the connection. If the configuration is correct, check the cabling to the router and have the carrier verify the integrity of the line.

If the input errors are increasing, check the cabling to the router and have the carrier verify the integrity of the line.

If you are sending output keepalives but are not receiving any input keepalives, verify that the encapsulation and keepalive configurations match on both ends of the connection.

Table 31 on page 132 lists and describes the SONET error statistics in the output for the `monitor interface` command. The output fields are listed in the order in which they appear in the output.

Table 31: SONET Error Statistics

Output Field	Output Field Description
Input errors	Sum of the incoming frame aborts and FCS errors.
Input 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 random early detection (RED) mechanism.
Input framing errors	The number of packets that have FCS errors.
Policed discards	Frames that the incoming packet match code discarded because they were not recognized or of interest. Usually, this field reports protocols that the Junos OS does not handle.

Table 31: SONET Error Statistics (*continued*)

Output Field	Output Field Description
L3 incompletes	Increments when the incoming packet fails Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header would be discarded and this counter would increment.
L2 channel errors	Increments when the software cannot find a valid logical interface for an incoming frame.
L2 mismatch timeouts	Count of malformed or short packets that cause the incoming packet handler to discard the frame as unreadable.
Carrier transitions	Number of times the interface has gone from down to up. This number should not increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or a similar problem occurs. If it increments quickly (perhaps once every 10 seconds), then the cable, the far-end system, or the PIC is broken.
Output errors	Sum of the outgoing frame aborts and FCS errors. Because output errors are rare, hardware problems, configuration, or software bugs might contribute to the cause of them. Use the output of the show interfaces type-fpc/pic/port extensive command for more details about which output errors are incrementing. Also, analyze the system or interface load to determine if those areas are contributing to the cause of the problem. If the problem persists, open a case with the Juniper Networks Technical Assistance Center (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).
Output 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.

CHAPTER 14

Use Loopback Testing for SONET Interfaces

This chapter describes the steps for using loopback testing to isolate SONET interface problems.

- [Checklist for Using Loopback Testing for SONET Interfaces on page 135](#)
- [Diagnose a Suspected Hardware Problem with a SONET Interface on page 137](#)
- [Create a Loopback on page 137](#)
- [Set Clocking to Internal on page 138](#)
- [Verify That the SONET Interface Is Up on page 139](#)
- [Clear SONET Interface Statistics on page 141](#)
- [Check That the Received and Transmitted Path Trace Are the Same on page 141](#)
- [Force the Link Layer to Stay Up on page 142](#)
- [Verify the Status of the Logical Interface on page 144](#)
- [Ping the SONET Interface on page 145](#)
- [Check for SONET Interface Error Statistics on page 145](#)
- [Diagnose a Suspected Circuit Problem on page 147](#)

Checklist for Using Loopback Testing for SONET Interfaces

Purpose To use loopback testing to isolate SONET interface problems.

Action [Table 32 on page 135](#) provides the links and commands for using loopback testing for SONET interfaces.

Table 32: Checklist for Using Loopback Testing for SONET Interfaces

Tasks	Command or Action
“Diagnose a Suspected Hardware Problem with a SONET Interface” on page 137	
1. Create a Loopback on page 137	
a. Create a Physical Loopback on page 137	Connect the transmit port to the receive port.

Table 32: Checklist for Using Loopback Testing for SONET Interfaces (*continued*)

Tasks	Command or Action
b. Configure a Local Loopback on page 138	<code>[edit interfaces <i>interface-name</i> sonet-options] set loopback local show commit</code>
2. Set Clocking to Internal on page 138	<code>[edit interfaces <i>interface-name</i>] set clocking internal show commit</code>
3. Verify That the SONET Interface Is Up on page 139	<code>show interfaces so-<i>fpc/pic/port</i></code>
4. Clear SONET Interface Statistics on page 141	<code>clear interfaces statistics so-<i>fpc/pic/port</i></code>
5. Check That the Received and Transmitted Path Trace Are the Same on page 141	<code>show interfaces so-<i>fpc/pic/port</i> extensive</code>
6. Force the Link Layer to Stay Up on page 142	
a. Configure Encapsulation to Cisco-HDLC on page 142	<code>[edit interfaces <i>interface-name</i>] set encapsulation cisco-hdlc show commit</code>
b. Configure No-Keepalives on page 143	<code>[edit interfaces <i>interface-name</i>] set no-keepalives show commit</code>
7. Verify the Status of the Logical Interface on page 144	<code>show interfaces so-<i>fpc/pic/port</i> show interfaces so-<i>fpc/pic/port</i> terse</code>
8. Ping the SONET Interface on page 145	<code>ping interface so-<i>fpc/pic/port</i> local-IP-address bypass-routing count 1000 rapid</code>
9. Check for SONET Interface Error Statistics on page 145	<code>show interfaces so-<i>fpc/pic/port</i> extensive</code>
“Diagnose a Suspected Circuit Problem” on page 147	
1. Create a Loop from the Router to the Network on page 147	<code>[edit interfaces <i>interface-name</i> sonet-options] set loopback remote show commit</code>
2. Create a Loop to the Router from Various Points in the Network on page 148	Perform Steps 2 through 8 from “ Diagnose a Suspected Hardware Problem with a SONET Interface ” on page 137.

Diagnose a Suspected Hardware Problem with a SONET Interface

Problem When you suspect a hardware problem, take the following steps to verify if there is a problem.

Solution To diagnose a suspected hardware problem with the SONET interface, follow these steps:

- [Create a Loopback on page 137](#)
- [Set Clocking to Internal on page 138](#)
- [Verify That the SONET Interface Is Up on page 139](#)
- [Clear SONET Interface Statistics on page 141](#)
- [Check That the Received and Transmitted Path Trace Are the Same on page 141](#)
- [Force the Link Layer to Stay Up on page 142](#)
- [Verify the Status of the Logical Interface on page 144](#)
- [Ping the SONET Interface on page 145](#)
- [Check for SONET Interface Error Statistics on page 145](#)

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 transmit and receive ports. 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 137](#)
2. [Configure a Local Loopback on page 138](#)

Create a Physical Loopback

Action To create a physical loopback at the port, connect the transmit port to the receive port using a known good fiber cable.



NOTE: Make sure you use a single-mode fiber for a single-mode port and multimode fiber for a multimode port. (For OC192, you must use the appropriate attenuation.)

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 without physically connecting the transmit port to the receive port, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces interface-name sonet-options
```

2. Configure the local loopback:

```
[edit interfaces interface-name sonet-options]
user@host# set loopback local
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces so-1/0/0 sonet-options]
user@host# show
loopback local;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces so-1/0/0 sonet-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.

- Related Documentation**
- [Set Clocking to Internal on page 138](#)
 - [Diagnose a Suspected Hardware Problem with a SONET Interface on page 137](#)

Set Clocking to Internal

Purpose Clocking is set to internal because there is no external clock source in a loopback connection.

Action To configure clocking to internal, follow these steps:

1. In configuration mode, go to the following hierarchy level:


```
[edit]
user@host# edit interfaces interface-name
```

2. Configure clocking to internal:

```
[edit interfaces interface-name]
user@host# set clocking internal
user@host# commit
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces so-1/0/0]
user@host# show
clocking internal;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces so-1/0/0]
user@host# commit
commit complete
```

Meaning The clock source for the interface is set to the internal Stratum 3 clock.

- Related Documentation**
- [Create a Loopback on page 137](#)
 - [Verify That the SONET Interface Is Up on page 139](#)

Verify That the SONET Interface Is Up

Purpose Displaying the status of the SONET interface provides the information you need to determine whether the physical link is up or down.

Action To verify that the SONET interface is up, use the following Junos OS command-line interface (CLI) operational mode command:

```
user@host> show interfaces so-fpc/pic/port
```

Sample Output 1 The following output is for a SONET interface with the physical link up:

```
user@host# show interfaces so-2/2/0
Physical interface: so-2/2/0, Enabled, Physical link is Up
Interface index: 21, SNMP ifIndex: 45
Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC3,
Loopback: None, FCS: 16,
Payload scrambler: Enabled
Device flags   : Present Running Loop-Detected
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
Input rate      : 48 bps (0 pps)
Output rate     : 56 bps (0 pps)
SONET alarms    : None
SONET defects   : None
Logical interface so-2/2/0.0 (Index 7) (SNMP ifIndex 33)
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: 10.0.2/24, Local: 10.0.2.1

```

Meaning Sample output 1 shows that the physical link is up, the loop is detected, and there are no SONET alarms or defects.

If the physical link is up, continue with [“Check That the Received and Transmitted Path Trace Are the Same” on page 141](#).

Sample Output 2 When you see that the physical link is down, there might be a problem with the port. Sample output 2 shows that the physical link is down:

```

user@host# show interfaces so-2/2/0
Physical interface: so-2/2/0, Enabled, Physical link is Down
Interface index: 21, SNMP ifIndex: 45
Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC3,
Loopback: None, FCS: 16,
Payload scrambler: Enabled
Device flags   : Present Running Down
Interface flags: Hardware-Down 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
Input rate      : 0 bps (0 pps)
Output rate     : 0 bps (0 pps)
SONET alarms    : LOL, LOS
SONET defects   : LOL, LOF, LOS, SEF, AIS-L, AIS-P
Logical interface so-2/2/0.0 (Index 7) (SNMP ifIndex 33)
Flags: Hardware-Down Device-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: 10.0.2/24, Local: 10.0.2.1

```

Meaning The sample output shows that the physical link is down, the device flags and interface flags are down, and there are SONET alarms and defects.

[Table 33 on page 140](#) lists problem situations and actions for a physical link that is down.

Table 33: Problems and Solutions for a Physical Link That Is Down

Problem	Action
Cable mismatch	Verify that the fiber connection is correct.

Table 33: Problems and Solutions for a Physical Link That Is Down
(continued)

Problem	Action
Damaged and/or dirty cable	Verify that the fiber can successfully loop a known good port of the same type.
Too much or too little optical attenuation	Verify that the attenuation is correct per the PIC optical specifications.
The transmit port is not transmitting within the dBm optical range per the specifications	Verify that the Tx power of the optics is within range of the PIC optical specification.

- Related Documentation**
- [Set Clocking to Internal on page 138](#)
 - [Clear SONET Interface Statistics on page 141](#)

Clear SONET Interface Statistics

- Purpose** You must reset SONET interface statistics before you initiate 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 diagnostics.
- Action** To clear all statistics for the interface, use the following Junos OS CLI operational mode command:
- ```
user@host> clear interfaces statistics so-fpc/pic/port
```
- Sample Output**
- ```
user@host> clear interfaces statistics so-4/0/2
user@host>
```
- Meaning** This command clears the interface statistics counters for interface **so-4/0/2** only.
- Related Documentation**
- [Verify That the SONET Interface Is Up on page 139](#)
 - [Check That the Received and Transmitted Path Trace Are the Same on page 141](#)

Check That the Received and Transmitted Path Trace Are the Same

- Purpose** The received and transmitted path trace shows whether the transmitted path trace is looped back.
- Action** To check that the received path trace matches the transmitted path trace, use the following Junos OS CLI operational mode command:
- ```
user@host> show interfaces so-fpc/pic/port extensive
```
- Sample Output**
- ```
user@host# show interfaces so-2/2/0 extensive
```

```

Physical interface: so-2/2/0, Enabled, Physical link is Up
Interface index: 21, SNMP ifIndex: 45, Generation: 20
[...Output truncated...]
Received path trace: host so-2/2/0
70 6c 75 74 6f 6e 69 63 20 73 6f 2d 32 2f 32 2f  host so-2/2/
30 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  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 0d 0a  .....
Transmitted path trace: host so-2/2/0
70 6c 75 74 6f 6e 69 63 20 73 6f 2d 32 2f 32 2f  host so-2/2/
30 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  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  .....
[...Output truncated...]

```

Meaning This transmitted and received path trace information is near the end of the output. The sample output shows that the transmitted and received path trace are the same. When there is a loopback, the transmitted and received path trace should be the same. If they are, continue with [“Force the Link Layer to Stay Up” on page 142](#).

If the transmitted and received path trace are not the same, the physical loopback cable is probably on the wrong port, or is incorrectly connected. In this case, verify the connection again.

Related Documentation

- [Clear SONET Interface Statistics on page 141](#)
- [Force the Link Layer to Stay Up on page 142](#)

Force the Link Layer to Stay Up

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.

To force the link layer to stay up, follow these steps:

1. [Configure Encapsulation to Cisco-HDLC on page 142](#)
2. [Configure No-Keepalives on page 143](#)

Configure Encapsulation to Cisco-HDLC

Action To configure encapsulation on a SONET 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 so-1/0/0]
user@host# show
encapsulation hdlc;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces so-1/0/0]
user@host# commit
commit complete
```

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 SONET physical 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 so-1/0/0]
user@host# show
no-keepalives;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces so-1/0/0]
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.

- Related Documentation**
- [Verify the Status of the Logical Interface on page 144](#)
 - [Check That the Received and Transmitted Path Trace Are the Same on page 141](#)
 - [Ping the SONET Interface on page 145](#)

Verify the Status of the Logical Interface

Purpose To verify the status of the logical interface, use the following two Junos OS CLI operational mode commands:

Action

```
user@host> show interfaces so-fpc/pic/port
user@host> show interfaces so-fpc/pic/port terse
```

Sample Output 1 The following sample output displays the information for a logical interface that is up:

```
user@host> show interfaces so-2/2/0
Physical interface: so-2/2/0, Enabled, Physical link is Up
Interface index: 21, SNMP ifIndex: 45
Link-level type: Cisco-HDLC, 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
Link flags     : No-Keepalives
Input rate     : 0 bps (0 pps)
Output rate    : 0 bps (0 pps)
SONET alarms   : None
SONET defects  : None
Logical interface so-2/2/0.0 (Index 7) (SNMP ifIndex 33)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Protocol inet, MTU: 4470, Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 10.0.2/24, Local: 10.0.2.1

user@host> show interfaces so-2/2/0 terse
Interface      Admin Link Proto Local          Remote
so-2/2/0       up    up
so-2/2/0.0     up    up   inet  10.0.2.1/24
```

Meaning The **show interfaces** command in sample output 1 shows that the logical link is up because there are no flags indicating that the link layer is down. The output for the **show interfaces terse** command shows that logical interface **so-2/2/0.0** is up.

Sample Output 2 The following sample output displays the information for a logical interface that is down:

```
user@host> show interfaces so-2/2/0
Physical interface: so-2/2/0, Enabled, Physical link is Up
Interface index: 21, SNMP ifIndex: 45
Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal, SONET mode, Speed:
OC3, Loopback: None,
FCS: 16, Payload scrambler: Enabled
Device flags   : Present Running Loop-Detected
Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps
Link flags     : Keepalives
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive: Input: 14 (00:00:05 ago), Output: 14 (00:00:05 ago)
```

```
user@host> show interfaces so-2/2/0 terse
Interface      Admin Link Proto Local                               Remote
so-2/2/0       up      down
so-2/2/0.0     up      down  inet  10.0.2.1/24
```

Ping the SONET Interface

Check for SONET Interface Error Statistics

145

Action To check the local interface for error statistics, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces so-fpc/pic/port extensive
```

Sample Output

```
user@host# show interfaces so-2/2/0 extensive
Physical interface: so-2/2/0, Enabled, Physical link is Up
[...Output truncated...]
Statistics last cleared: 2002-04-24 10:39:40 EDT (00:13:26 ago)
Traffic statistics:
Input bytes :                169686                0 bps
Output bytes :               179802                0 bps
Input packets:                2101                0 pps
Output packets:              2102                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: 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         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
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
SONET path:
BIP-B3         0      0
REI-P          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
[...Output truncated...]

```

Meaning Check for any error statistics that may appear in the section, line, and path areas of 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).

Related Documentation

- [Ping the SONET Interface on page 145](#)
- [Diagnose a Suspected Circuit Problem on page 147](#)

Diagnose a Suspected Circuit Problem

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. [Create a Loop from the Router to the Network on page 147](#)
2. [Create a Loop to the Router from Various Points in the Network on page 148](#)

Create a Loop from the Router to the Network

Purpose Creating a loop from the router to the network allows the transport-layer engineer to test the router from various points in the network. This helps the engineer isolate where the problem might be located.

Action To create a loop from the router to the network, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```

[edit]
user@host# edit interfaces interface-name sonet-options

```

2. Configure the remote loopback:

```

[edit interfaces interface-name sonet-options]
user@host# set loopback remote

```

3. Verify the configuration:

```

user@host# show

```

For example:

```

[edit interfaces so-1/0/0 sonet-options]
user@host# show
loopback remote;

```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces so-1/0/0 sonet-options]
user@host# commit
commit complete
```

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 8 in [“Diagnose a Suspected Hardware Problem with a SONET Interface” on page 137](#). 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**
- [Check for SONET Interface Error Statistics on page 145](#)
 - [Create a Loop to the Router from Various Points in the Network on page 148](#)

CHAPTER 15

Locate SONET Alarms and Errors

This chapter describes the most common SONET alarms and errors you can encounter when investigating line problems on a Juniper Networks router. For a useful reference for details on SONET interfaces, refer to the Telcordia/Bellcore Standard GR-253 CORE, available from www.telcordia.com.

- [List of Common SONET Alarms and Errors on page 149](#)
- [Display SONET Alarms and Errors on page 151](#)
- [Locate Most Common SONET Alarms and Errors on page 154](#)
- [Locate Loss of Signal Alarms on page 155](#)
- [Locate Alarm Indication Signal Alarms on page 156](#)
- [Locate Remote Defect Indication Alarms on page 158](#)
- [Locate Remote Error Indication Line Errors on page 160](#)
- [Locate Bit Error Rate Alarms on page 163](#)
- [Locate Payload Label Mismatch Path Alarms on page 164](#)
- [Locate Loss of Pointer Path Alarms on page 167](#)
- [Locate Unequipped Payload Alarms on page 168](#)
- [Locate Phase Lock Loop Alarms on page 170](#)

List of Common SONET Alarms and Errors

Purpose	To check for the most common SONET alarms and errors you can encounter when investigating line problems on a Juniper Networks router.
Action	Table 34 on page 149 provides links and commands for checking SONET alarms and errors.

Table 34: List of Common SONET Alarms and Errors

Tasks	Command or Action
“Display SONET Alarms and Errors” on page 151	<code>show interfaces so-fpc/pic/port extensive</code>
“Locate Most Common SONET Alarms and Errors” on page 154	

Table 34: List of Common SONET Alarms and Errors (*continued*)

Tasks	Command or Action
1. Locate Loss of Signal Alarms on page 155	Check the connection between the router port and the first SONET network element.
2. Locate Alarm Indication Signal Alarms on page 156	Downstream from the router, check the path-terminating equipment, section-terminating equipment, and line-terminating equipment for a loss of signal or loss of frame.
3. Locate Remote Defect Indication Alarms on page 158	Upstream from the router, check the path-terminating equipment, section-terminating equipment, and line-terminating equipment for a loss of signal or loss of frame.
4. Locate Remote Error Indication Line Errors on page 160	Upstream from the router, check the line-terminating equipment and path-terminating equipment for an error in the B2 or B3 byte.
5. Locate Bit Error Rate Alarms on page 163	Check the following: <ul style="list-style-type: none"> • Optical fiber • Optical transmitter and receiver • Clocking • Attenuation in the optical signal
6. Locate Payload Label Mismatch Path Alarms on page 164	Check the received and transmitted C2 byte.
7. Locate Loss of Pointer Path Alarms on page 167	Check that both sides of the connection are configured for concatenate or nonconcatenate mode.
8. Locate Unequipped Payload Alarms on page 168	Check provisioning with the SONET provider, and if possible, check the configuration of the add/drop multiplexer (ADM).
9. Locate Phase Lock Loop Alarms on page 170	Investigate the timing source, and configure the clocking to external or internal depending on the situation.

Related Documentation

- [Display SONET Alarms and Errors on page 151](#)
- [Locate Most Common SONET Alarms and Errors on page 154](#)
- [Locate Loss of Signal Alarms on page 155](#)
- [Locate Alarm Indication Signal Alarms on page 156](#)
- [Locate Remote Defect Indication Alarms on page 158](#)
- [Locate Remote Error Indication Line Errors on page 160](#)
- [Locate Bit Error Rate Alarms on page 163](#)
- [Locate Payload Label Mismatch Path Alarms on page 164](#)
- [Locate Loss of Pointer Path Alarms on page 167](#)
- [Locate Unequipped Payload Alarms on page 168](#)

- [Locate Phase Lock Loop Alarms on page 170](#)

Display SONET Alarms and Errors

Action To display SONET alarms and errors, use the following Junos OS command-line interface (CLI) operational mode command:

```
user@host> show interfaces so-fpc/pic/port extensive
```

Sample Output

```
user@host> show interfaces so-1/1/1 extensive
[...Output truncated...]
Active alarms : None
Active defects : None
SONET PHY:
  PLL Lock          Seconds    Count  State
  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
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
[...Output truncated...]
```

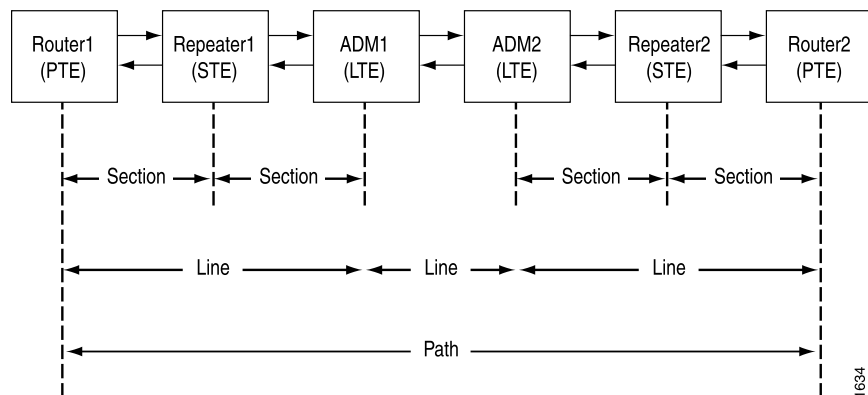
Meaning The sample output shows where you find SONET alarms and errors. SONET alarms and errors fall into three different areas of the output: section, line, and path.

Section, line, and path errors occur over different spans of the SONET network and between different pieces of equipment. [Figure 11 on page 152](#) shows an example of a

SONET network with the section, line, and path areas delimited. [Figure 11 on page 152](#) also shows the different pieces of equipment that comprise a SONET network:

- A router, usually a path-terminating equipment (PTE)
- An add/drop multiplexer (ADM), usually a line-terminating equipment (LTE)
- A repeater, usually a section-terminating equipment (STE)

Figure 11: Example of a SONET Network



SONET Section The SONET section is the connection between two STEs. The STE performs the simple regeneration of the SONET signal to the next SONET equipment span between itself, the PTE, and the ADM. For example, Repeater 1 (STE) regenerates the SONET signal between itself and ADM1, and the section between itself and Router 1 (PTE). The STE checks to make sure that the incoming SONET frame, arriving from a directly connected neighbor, is good. An STE does not have any knowledge of the rest of the span.

An STE looks at the section overhead bytes of the SONET frame even though it can rewrite the other overhead bytes if an alarm is generated.

SONET Line The SONET line is the span between two LTEs. The LTE pays particular attention to the line overhead bytes of the SONET frame, can add and remove payload, and has more knowledge of the SONET network than the STEs. The LTE does not do the final processing of the SONET payload as does the PTE. The ADM is an LTE.

SONET Path The SONET path is the span between two PTEs. The PTE is the final destination where the SONET frame is terminated and the payload it carries is processed. A PTE pays particular attention to the path overhead bytes of the SONET frame.

SONET System Hierarchy The SONET system hierarchy is comprised of PTEs, LTEs, and STEs. The characteristics of each are as follows:

- The main role of a PTE is to read the path overhead bytes. However, it also reads the line overhead bytes and the section overhead bytes. Therefore the PTE also plays the role of an LTE and an STE.

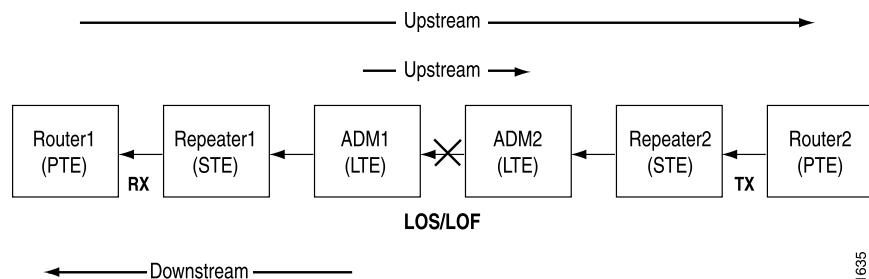
- The main role of an LTE is to read the line overhead bytes. However, it also reads the section overhead bytes. Therefore the LTE also plays the role of an STE.
- An STE reads only the section overhead bytes of the SONET frame. (See [Figure 12 on page 153](#).)

Upstream and Downstream

The terms *upstream* and *downstream* are used in defining SONET alarms and errors. The terms are meaningful when viewed from the point of view of the failure in the circuit.

For example, in [Figure 12 on page 153](#) the failure occurs in the section between ADM 1 and ADM 2. The signal is transmitted from Router 2 in the direction of Router 1 (from right to left). In this example, Router 1, Repeater 1, and ADM 1 are downstream from the failure. ADM 2, Repeater 2, and Router 2 are upstream from the failure.

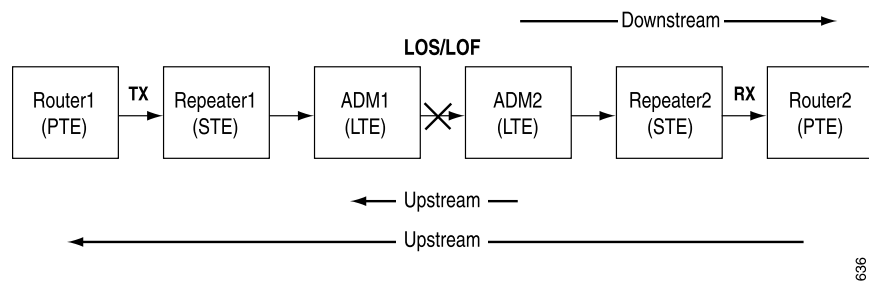
Figure 12: Example of an Upstream or Downstream Failure



The failure sends an alarm from ADM 1 to Router 1 in the direction of the signal transmission (downstream). Alarms are also sent from ADM1 to ADM2 and from Router1 to Router2 in the opposite direction of the signal transmission (upstream).

In [Figure 13 on page 153](#), the failure is also between ADM 1 and ADM 2. However, the signal is transmitted from Router 1 in the direction of Router 2 (from left to right). Router 2, Repeater 2, and ADM 2 are downstream from the failure. ADM 1, Repeater 1, and Router 1 are upstream from the failure.

Figure 13: Another Example of an Upstream or Downstream Failure



This failure sends an alarm from ADM 2 to Router 2 in the direction of the signal transmission (downstream). Alarms are also sent from ADM 2 to ADM 1 and from Router 2 to Router 1 in the opposite direction of the signal transmission (upstream).

All diagnostics are from the perspective of the PTE (the Juniper Networks router). Although the exact source of the problem can be difficult to find without having access to the LTE

or the STE, you can at least determine from the PTE output whether the problem is remote or local.

Related Documentation

- [List of Common SONET Alarms and Errors on page 149](#)
- [Locate Most Common SONET Alarms and Errors on page 154](#)
- [Locate Loss of Signal Alarms on page 155](#)
- [Locate Alarm Indication Signal Alarms on page 156](#)
- [Locate Remote Defect Indication Alarms on page 158](#)
- [Locate Remote Error Indication Line Errors on page 160](#)
- [Locate Bit Error Rate Alarms on page 163](#)
- [Locate Payload Label Mismatch Path Alarms on page 164](#)
- [Locate Loss of Pointer Path Alarms on page 167](#)
- [Locate Unequipped Payload Alarms on page 168](#)
- [Locate Phase Lock Loop Alarms on page 170](#)

Locate Most Common SONET Alarms and Errors

Problem This information describes the most common SONET alarms and errors you can encounter when investigating line problems on a Juniper Networks router.

Solution The following alarms and errors are described in this section:

- [Locate Loss of Signal Alarms on page 155](#)
- [Locate Alarm Indication Signal Alarms on page 156](#)
- [Locate Remote Defect Indication Alarms on page 158](#)
- [Locate Remote Error Indication Line Errors on page 160](#)
- [Locate Bit Error Rate Alarms on page 163](#)
- [Locate Payload Label Mismatch Path Alarms on page 164](#)
- [Locate Loss of Pointer Path Alarms on page 167](#)
- [Locate Unequipped Payload Alarms on page 168](#)
- [Locate Phase Lock Loop Alarms on page 170](#)

Related Documentation

- [List of Common SONET Alarms and Errors on page 149](#)
- [Display SONET Alarms and Errors on page 151](#)
- [Locate Loss of Signal Alarms on page 155](#)
- [Locate Alarm Indication Signal Alarms on page 156](#)
- [Locate Remote Defect Indication Alarms on page 158](#)

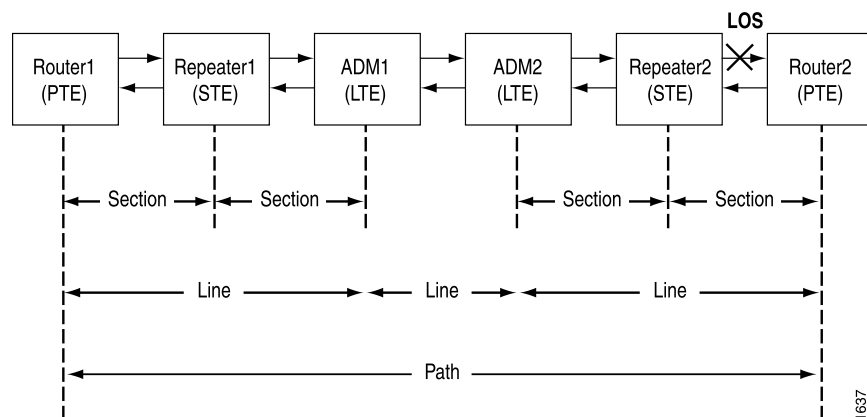
- [Locate Remote Error Indication Line Errors on page 160](#)
- [Locate Bit Error Rate Alarms on page 163](#)
- [Locate Payload Label Mismatch Path Alarms on page 164](#)
- [Locate Loss of Pointer Path Alarms on page 167](#)
- [Locate Unequipped Payload Alarms on page 168](#)
- [Locate Phase Lock Loop Alarms on page 170](#)

Locate Loss of Signal Alarms

Problem A loss of signal (LOS) alarm indicates that there is a physical link problem with the connection to the router receive port from the neighboring SONET equipment transmit port.

Solution To locate the LOS alarm, check the connection between the router port and the first SONET network element. In the example network in [Figure 14 on page 155](#), the X indicates that there is a connection problem between Repeater 2 and Router 2.

Figure 14: Location of an LOS Alarm in a SONET Network



To display SONET alarms and errors, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces so-fpc/pic/port extensive
```

Sample Output user@router2> show interfaces so-1/1/1 extensive

```
[... Output truncated...]
Active alarms : LOL, PLL, LOS
Active defects : LOL, PLL, LOF, LOS , SEF, AIS-L, AIS-P, PLM-P
SONET PHY:
  PLL Lock          51          0  PLL Lock Error
  PHY Light         51          0  Light Missing
SONET section:
  BIP-B1            0          0
  SEF               51          0  Defect Active
  LOS 51           0  Defect Active
```

```

LOF                    51          0 Defect Active
[...Output truncated...]

```

Meaning The sample output shows at the time the command was run, Router 2 continued to be in a LOS alarm state for around 51 seconds.

- Related Documentation**
- [List of Common SONET Alarms and Errors on page 149](#)
 - [Display SONET Alarms and Errors on page 151](#)
 - [Locate Most Common SONET Alarms and Errors on page 154](#)
 - [Locate Alarm Indication Signal Alarms on page 156](#)
 - [Locate Remote Defect Indication Alarms on page 158](#)
 - [Locate Remote Error Indication Line Errors on page 160](#)
 - [Locate Bit Error Rate Alarms on page 163](#)
 - [Locate Payload Label Mismatch Path Alarms on page 164](#)
 - [Locate Loss of Pointer Path Alarms on page 167](#)
 - [Locate Unequipped Payload Alarms on page 168](#)
 - [Locate Phase Lock Loop Alarms on page 170](#)

Locate Alarm Indication Signal Alarms

An alarm indication signal (AIS) is sent downstream to signal an error condition. There are two types of AIS alarms:

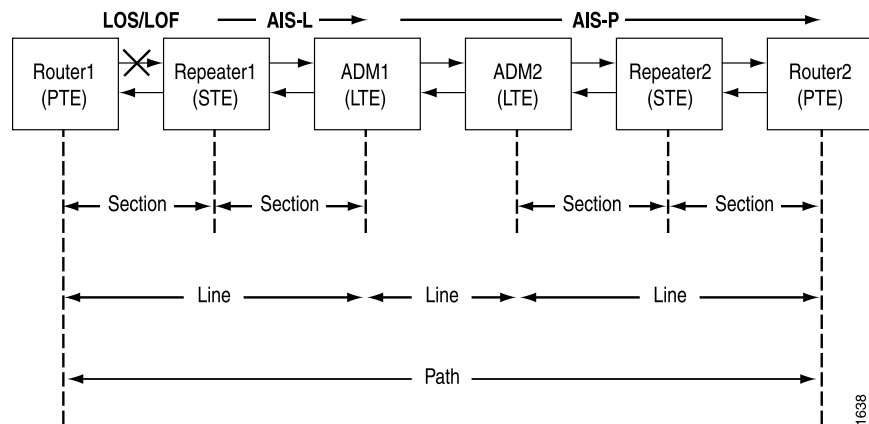
- Alarm indication signal path (AIS-P) is sent by an LTE to a downstream PTE when an LOS or LOF is detected on a upstream SONET section.
 - Alarm indication signal line (AIS-L) is sent by an STE to a downstream LTE when an LOS or LOF is detected on an incoming SONET section.
1. [Example of a Router Receiving Only an AIS-P Alarm on page 156](#)
 2. [Example of a Router Receiving Both an AIS-L and AIS-P Alarm on page 157](#)

Example of a Router Receiving Only an AIS-P Alarm

Problem [Figure 15 on page 157](#) shows a router receiving only an AIS-P alarm. The X indicates that the LOS or LOF occurs in the section between Router 1 and Repeater 1.

Solution All diagnostics are from the perspective of Router 2 (the Juniper Networks router).

Figure 15: Example of a Router Receiving Only an AIS-P Alarm



Meaning In Figure 15 on page 157, the progression of events occurring after the failure is as follows:

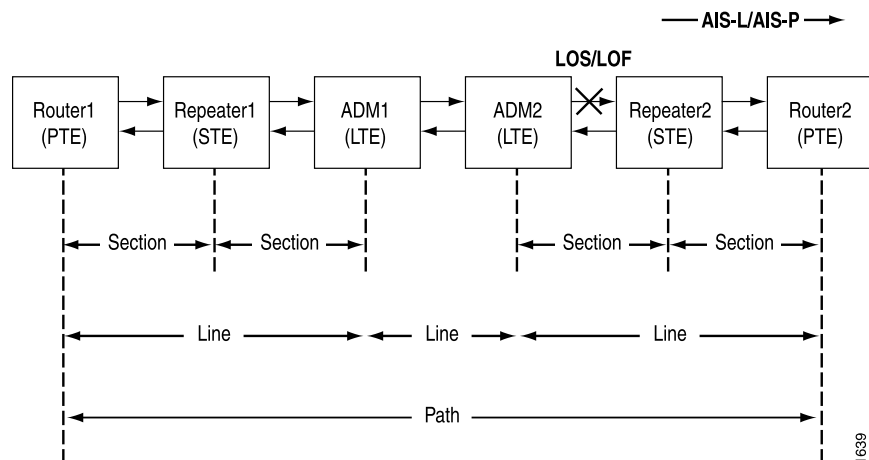
1. Repeater 1 detects an LOS or LOF on an incoming SONET section.
2. Repeater 1 sends an AIS-L downstream to ADM1 (LTE).
3. ADM 1 sends an AIS-P to Router 2 (PTE).
4. The only alarm that Router 2 receives is the AIS-P alarm from ADM 1.

Example of a Router Receiving Both an AIS-L and AIS-P Alarm

Problem Figure 16 on page 157 shows a router receiving both an AIS-L and AIS-P Alarm. The X indicates that the LOS or LOF occurs in the section between ADM 2 and Repeater 2.

Solution All diagnostics are from the perspective of Router 2 (the Juniper Networks router).

Figure 16: Example of a Router Receiving Both an AIS-L and an AIS-P Alarm



What It Means In Figure 16 on page 157, the progression of events occurring after the failure is as follows:

1. Repeater 2 detects an LOS or LOF on the incoming section.
2. Repeater 2 sends an AIS-L and AIS-P downstream to Router 2.
3. Router 2 receives both an AIS-L and an AIS-P from Repeater 2.

Related Documentation

- [List of Common SONET Alarms and Errors on page 149](#)
- [Display SONET Alarms and Errors on page 151](#)
- [Locate Most Common SONET Alarms and Errors on page 154](#)
- [Locate Loss of Signal Alarms on page 155](#)
- [Locate Alarm Indication Signal Alarms on page 156](#)
- [Locate Remote Defect Indication Alarms on page 158](#)
- [Locate Remote Error Indication Line Errors on page 160](#)
- [Locate Bit Error Rate Alarms on page 163](#)
- [Locate Payload Label Mismatch Path Alarms on page 164](#)
- [Locate Loss of Pointer Path Alarms on page 167](#)
- [Locate Unequipped Payload Alarms on page 168](#)
- [Locate Phase Lock Loop Alarms on page 170](#)

Locate Remote Defect Indication Alarms

A remote defect indication (RDI) is sent upstream to signal an error condition. There are two types of RDI alarms:

- Remote defect indication line (RDI-L) is sent upstream to a peer LTE when an alarm indication signal line (AIS-L) or low-level defects are detected.
- Remote defect indication path (RDI-P) is sent upstream to a peer PTE when a defect in the signal, typically an AIS-P, is detected.

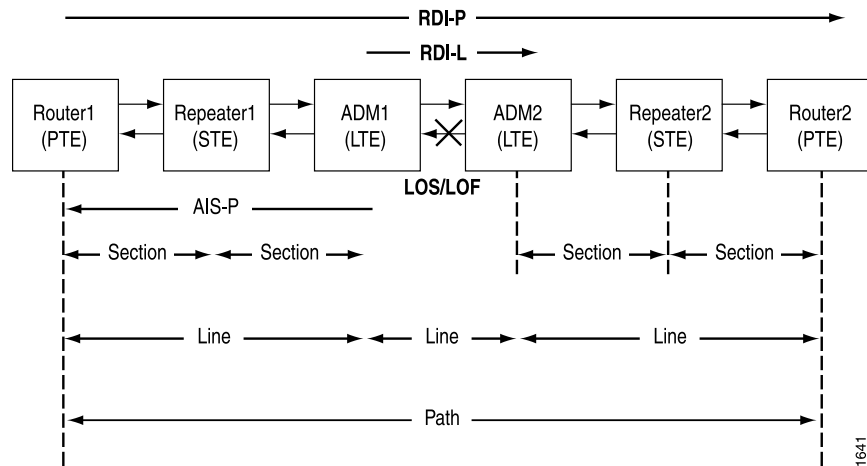
1. [Example of a Router Receiving Only an RDI-P Alarm on page 158](#)
2. [Example of a Router Receiving Both an RDI-L and RDI-P Alarm on page 159](#)

Example of a Router Receiving Only an RDI-P Alarm

Problem [Figure 17 on page 159](#) shows a router receiving only an RDI-P Alarm. The X indicates that the LOS or LOF occurs in the section between ADM 1 and ADM 2.

Solution All diagnostics are from the perspective of Router 2 (the Juniper Networks router).

Figure 17: Example of a Router Receiving Only an RDI-P Alarm



What It Means In Figure 17 on page 159, the progression of events occurring after the failure is as follows:

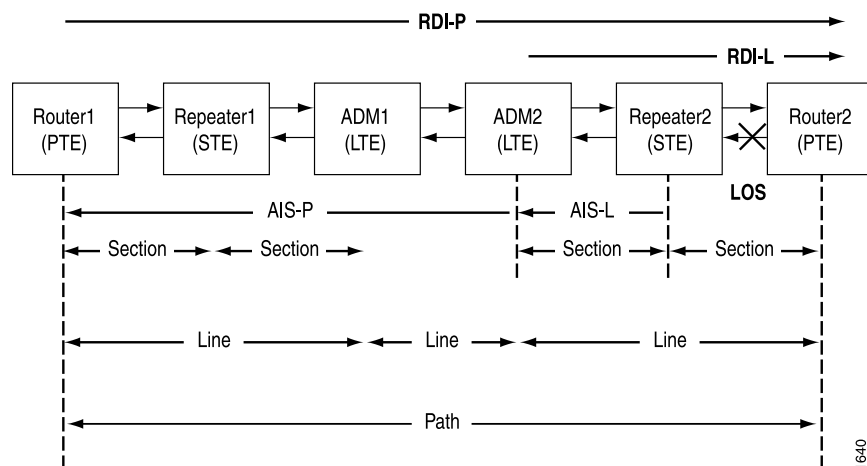
1. ADM 1 detects an LOS or LOF on an incoming SONET section.
2. ADM 1 sends an RDI-L to ADM 2.
3. ADM 1 sends an AIS-P downstream to Router 1.
4. Router 1 sends an RDI-P upstream to Router 2.
5. Router 2 only receives an RDI-P alarm.

Example of a Router Receiving Both an RDI-L and RDI-P Alarm

Problem Figure 18 on page 159 shows router receiving both an RDI-L and RDI-P Alarm. The X indicates that the LOS occurs in the section between Repeater 2 and Router 2.

Solution All diagnostics are from the perspective of Router 2 (the Juniper Networks router).

Figure 18: Example of a Router Receiving Both an RDI-L and RDI-P Alarm



Meaning In [Figure 18 on page 159](#), the progression of events occurring after the failure is as follows:

1. Repeater 2 detects an LOS on an incoming section.
2. Repeater 2 sends an AIS-L downstream to ADM 2.
3. ADM 2 sends an RDI-L upstream to Router 2.
4. ADM 2 sends an AIS-P downstream to Router 1.
5. Router 1 sends an RDI-P upstream to Router 2.
6. Router 2 receives both RDI-P and RDI-L alarms.

**Related
Documentation**

- [List of Common SONET Alarms and Errors on page 149](#)
- [Display SONET Alarms and Errors on page 151](#)
- [Locate Most Common SONET Alarms and Errors on page 154](#)
- [Locate Loss of Signal Alarms on page 155](#)
- [Locate Alarm Indication Signal Alarms on page 156](#)
- [Locate Remote Error Indication Line Errors on page 160](#)
- [Locate Bit Error Rate Alarms on page 163](#)
- [Locate Payload Label Mismatch Path Alarms on page 164](#)
- [Locate Loss of Pointer Path Alarms on page 167](#)
- [Locate Unequipped Payload Alarms on page 168](#)
- [Locate Phase Lock Loop Alarms on page 170](#)

Locate Remote Error Indication Line Errors

A remote error indication (REI) is sent upstream to signal an error condition. There are two types of REI alarms:

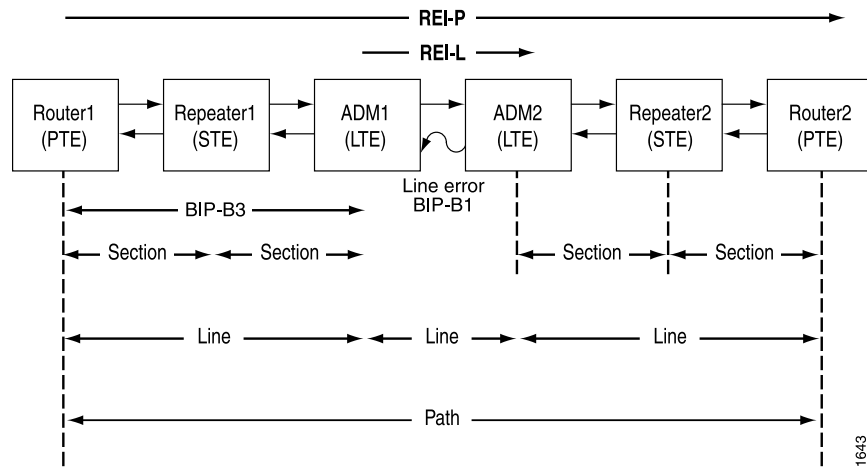
- Remote error indication line (REI-L) is sent to the upstream LTE when errors are detected in the B2 byte.
 - Remote error indication path (REI-P) is sent to the upstream PTE when errors are detected in the B3 byte.
1. [Example of Only an REI-P Counter Incrementing on page 160](#)
 2. [Example of Both REI-L and REI-P Counters Incrementing on page 161](#)

Example of Only an REI-P Counter Incrementing

Problem [Figure 19 on page 161](#) shows an REI-P Counter Incrementing. The wavy line indicates that there is a line error in the section between ADM 1 and ADM 2.

Solution All diagnostics are from the perspective of Router 2 (the Juniper Networks router).

Figure 19: Example of a Router Receiving Only an REI-P Counter Incrementing



Meaning In [Figure 19 on page 161](#), the progression of events occurring after the failure is as follows:

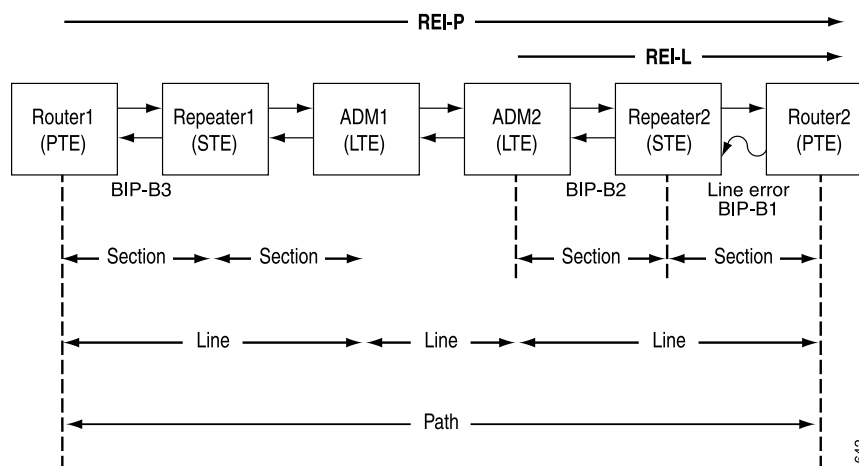
1. ADM 1 detects parity errors in the B1 byte.
2. ADM 1 sends an REI-L upstream to ADM 2.
3. Router 1 detects parity errors in the B3 byte.
4. Router 1 sends an REI-P upstream to Router 2.
5. Router 2 only sees an REI-P incrementing counter.

Example of Both REI-L and REI-P Counters Incrementing

Problem [Figure 20 on page 162](#) shows both REI-L and REI-P Counters Incrementing. The wavy line indicates that there is a line error in the section between Repeater 2 and Router 2.

Solution All diagnostics are from the perspective of Router 2 (the Juniper Networks router).

Figure 20: Example of a Router Receiving Both An REI-L and REI-P Counter Incrementing



Meaning In [Figure 20 on page 162](#), the progression of events occurring after the failure is as follows:

1. Repeater 2 detects some parity errors in the B1 byte from a corrupted SONET frame.
2. ADM 2 detects parity errors in the B2 byte.
3. ADM 2 sends an REI-L upstream to Router 2.
4. Router 1 detects parity errors in the B3 byte.
5. Router 1 sends back an REI-P upstream to Router 2.
6. Router 2 sees incrementing REI-L and REI-P errors.

Related Documentation

- [List of Common SONET Alarms and Errors on page 149](#)
- [Display SONET Alarms and Errors on page 151](#)
- [Locate Most Common SONET Alarms and Errors on page 154](#)
- [Locate Loss of Signal Alarms on page 155](#)
- [Locate Alarm Indication Signal Alarms on page 156](#)
- [Locate Remote Defect Indication Alarms on page 158](#)
- [Locate Bit Error Rate Alarms on page 163](#)
- [Locate Payload Label Mismatch Path Alarms on page 164](#)
- [Locate Loss of Pointer Path Alarms on page 167](#)
- [Locate Unequipped Payload Alarms on page 168](#)
- [Locate Phase Lock Loop Alarms on page 170](#)

Locate Bit Error Rate Alarms

Problem Bit error rate (BER) alarms are declared when the number of BIP-B2 errors hits a certain threshold. Depending on the threshold, there are two types of BER alarms. In both cases the interface is taken down.

- Bit error rate-signal degrade (BERR-SD) is declared when a bit error rate of 10^{-6} is reached.
- Bit error rate-signal failure (BERR-SF) is declared when a bit error rate of 10^{-3} is reached.

Solution To display SONET alarms and errors, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces so-fpc/pic/port extensive
```

Sample Output

The following sample output displays a BERR-SD error:

```
user@router2> show interfaces so-1/1/1 extensive
[... Output truncated...]
Active alarms : BERR-SD
Active defects : BERR-SD
SONET PHY:
Seconds      Count  State
  PLL Lock      0        0  OK
  PHY Light      0        0  OK
SONET section:
BIP-B1      22      101
SEF          0        0  OK
LOS          0        0  OK
LOF          0        0  OK
ES-S        22
SES-S        0
SEFS-S       0
SONET line:
BIP-B2      22      103
REI-L        0        0
RDI-L        0        0  OK
AIS-L        0        0  OK
BERR-SF      0        0  OK
BERR-SD     11      53  Defect Active
ES-L        22
SES-L        4
UAS-L        2
ES-LFE       0
SES-LFE      0
UAS-LFE      0
SONET path:
BIP-B3      22      166
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        22
SES-P        3
```

UAS-P	1
ES-PFE	0
SES-PFE	0
UAS-PFE	0

Meaning Bit error rates can be caused by any of the following situations:

- Degrading optical fiber
- Optical transmitter or receiver problems
- Dirty fiber-optic connector
- Clocking issues
- Too much attenuation in the optical signal
- BIP-B1 and BIP-B3 are not used in the BER alarm calculations

**Related
Documentation**

- [List of Common SONET Alarms and Errors on page 149](#)
- [Display SONET Alarms and Errors on page 151](#)
- [Locate Most Common SONET Alarms and Errors on page 154](#)
- [Locate Loss of Signal Alarms on page 155](#)
- [Locate Alarm Indication Signal Alarms on page 156](#)
- [Locate Remote Defect Indication Alarms on page 158](#)
- [Locate Remote Error Indication Line Errors on page 160](#)
- [Locate Payload Label Mismatch Path Alarms on page 164](#)
- [Locate Loss of Pointer Path Alarms on page 167](#)
- [Locate Unequipped Payload Alarms on page 168](#)
- [Locate Phase Lock Loop Alarms on page 170](#)

Locate Payload Label Mismatch Path Alarms

Problem Payload mismatch path (PLM-P) alarms are reported by PTEs because the SONET byte used to determine the PLM-P alarm is located in the path overhead (the C2 byte). PLM-P alarms occur when the C2 byte received does not match the C2 byte transmitted by the PTE; for example, when the received C2 value is **0xcf**, the transmitted C2 value must also be **0xcf**.



NOTE: When the received C2 byte has a value of 0x01, the PTE accepts this value (regardless of the PTE setting) since 0x01 is considered a wildcard value.

Solution To display SONET alarms and errors, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces so-fpc/pic/port extensive
```

Sample Output

```
user@router2> show interfaces so-1/1/1 extensive
[...Output truncated...]
SONET alarms : PLM-P
SONET defects : PLM-P
[...Output truncated...]
SONET path:
  BIP-B3          0          0
  REI-P           0          0
  LOP-P           0          0 OK
  AIS-P           0          0 OK
  RDI-P           2          1 OK
  UNEQ-P          0          0 OK
  PLM-P          96      1 Defect Active
  ES-P            0
  SES-P            0
  UAS-P            0
  ES-PFE           2
  SES-PFE           2
  UAS-PFE           0
Received SONET overhead:
  F1 : 0x00, J0 : 0x00, K1 : 0x00, K2 : 0x00
  S1 : 0x00, C2 : 0x13 , C2(cmp) : 0xcf, 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 : 0xcf , F2 : 0x00, Z3 : 0x00
  Z4 : 0x00, V5 : 0x00
```

Meaning In the **SONET path** section of the sample output, the PLM-P counter is incrementing and defective. In the **Received SONET overhead** and **Transmitted SONET overhead** sections, the received C2 value is **0x13** and the transmitted C2 value is **0xcf**. The C2 byte mismatch has caused a PLM-P alarm.

The C2 byte tells the PTE what kind of information is in the synchronous payload envelope (SPE). For example, when the SPE contains Asynchronous Transfer Mode (ATM) cells, the C2 byte has a value of **0x13**. If a Packet over SONET (POS) card is used on the Juniper Networks router, the link does not come up and a PLM-P alarm is raised (since the Juniper Networks router sends **0xcf** and receives **0x13**). However, if the C2 byte has a value of **0x01**, the PTE accepts this value (regardless of what the PTE is set to) since **0x01** is considered a wildcard value.

The SONET specifications have assigned a small handful of values (of the 256 possible binary values), but Juniper Networks routers only use a few of these (**0xcf** or **0x16** for POS, **0x13** for ATM, and so on). [Table 35 on page 166](#) shows the synchronous transport signal (STS) path signal label assignments as described in Issue 3 (Sept. 2000) of the GR-253 CORE.

Table 35: STS Path Signal Label Assignments

Code (Hex)	Content of the STS SPE
00	Unequipped
01	Equipped - Nonspecific Payload
02	VT-Structured STS1 SPE a
03	Locked VT Mode a
04	Asynchronous Mapping for DS3
12	Asynchronous Mapping for DS4NA
13	Mapping for ATM
14	Mapping for DQDB
15	Asynchronous Mapping for FDDI
16	HDLC-over-SONET Mapping
FE	O.181 Test Signal (TSS1 to TSS3) Mapping b

On POS interfaces, Juniper Networks routers by default accept a C2 value of either **0xcf** or **0x16**. Any other values raise a PLM-P alarm. An important thing to remember is that the C2 byte value of **0x16** is a standardized value (per RFC 2615, G.707, and GR-253) used for POS interfaces. **0xcf** is used by default since much SONET equipment still uses this value. If you need to change this byte, use the **rfc-2615** option as follows:

```
user@host# set interface so-fpc/pic/port sonet-options rfc-2615
```

This option changes the following values:

```
C2 byte 22 (0x16)
FCS 32
payload-scrambling (this was already the default)
```

Related Documentation

- [List of Common SONET Alarms and Errors on page 149](#)
- [Display SONET Alarms and Errors on page 151](#)
- [Locate Most Common SONET Alarms and Errors on page 154](#)
- [Locate Loss of Signal Alarms on page 155](#)
- [Locate Alarm Indication Signal Alarms on page 156](#)
- [Locate Remote Defect Indication Alarms on page 158](#)
- [Locate Remote Error Indication Line Errors on page 160](#)
- [Locate Bit Error Rate Alarms on page 163](#)

- [Locate Loss of Pointer Path Alarms on page 167](#)
- [Locate Unequipped Payload Alarms on page 168](#)
- [Locate Phase Lock Loop Alarms on page 170](#)

Locate Loss of Pointer Path Alarms

Problem A loss of pointer path (LOP-P) alarm indicates a possible provisioning problem and occurs when the Juniper Networks router cannot determine a valid payload pointer. The Juniper Networks router monitors the H1/H2 bytes, located in the line overhead area. This alarm is usually discovered upon initial provisioning of SONET circuits, and is not generally seen after the router has been deployed in the network for some time.

Solution To display SONET alarms and errors, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces so-fpc/pic/port extensive
```

Sample Output

```
user@host> show interfaces so-1/1/1 extensive
[...Output truncated...]
SONET alarms : LOP
SONET defects : LOP
SONET PHY:
SONET PHY:          Seconds          Count   State
  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
SONET path:
  BIP-B3             0                0
  REI-P              0                0
  LOP-P             174          0 Defect Active
  AIS-P              0                0    OK
  RDI-P              0                0    OK
  UNEQ-P             0                0    OK
  PLM-P              0                0    OK
  ES-P               174
  SES-P              174
  UAS-P              174
```

```

ES-PFE                0
SES-PFE                0
UAS-PFE                0
[...Output truncated...]

```

Meaning The sample output shows that an LOP-P alarm occurred for 174 seconds. An LOP-P alarm can occur when the ADM on the other end is configured for nonconcatenate mode, while the Juniper Networks router is configured for concatenate mode (the default setting). In this instance, the pointer word in the required STS frame does not have the concatenation indicator set.

The condition of 8, 9, or 10 consecutive frames without valid pointer values can raise an LOP-P alarm.



NOTE: Although Juniper routers do not report pointer adjustments, an LOP-P alarm will not occur as long as the pointer adjustments stay within tolerance levels.

Related Documentation

- [List of Common SONET Alarms and Errors on page 149](#)
- [Display SONET Alarms and Errors on page 151](#)
- [Locate Most Common SONET Alarms and Errors on page 154](#)
- [Locate Loss of Signal Alarms on page 155](#)
- [Locate Alarm Indication Signal Alarms on page 156](#)
- [Locate Remote Defect Indication Alarms on page 158](#)
- [Locate Remote Error Indication Line Errors on page 160](#)
- [Locate Bit Error Rate Alarms on page 163](#)
- [Locate Payload Label Mismatch Path Alarms on page 164](#)
- [Locate Unequipped Payload Alarms on page 168](#)
- [Locate Phase Lock Loop Alarms on page 170](#)

Locate Unequipped Payload Alarms

Problem An unequipped payload (UNEQ-P) alarm indicates a possible provisioning problem and occurs when the Juniper Networks router detects a value of 0x00 in the C2 byte.

Solution To display SONET alarms and errors, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces so-fpc/pic/port extensive
```

Sample Output

```

user@host> show interfaces so-1/1/1 extensive
[...Output truncated...]
SONET alarms :UNEQ-P

```

```

SONET defects : UNEQ-P
SONET PHY:           Seconds      Count  State
  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
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             10             2  Defect Active
  PLM-P              0             0  OK
  ES-P               10
  SES-P              10
  UAS-P              0
  ES-PFE             0
  SES-PFE            0
  UAS-PFE            0
[...Output truncated...]

```

Meaning The sample output shows that an UNEQ-P alarm occurred within 10 seconds and was declared twice. An UNEQ-P alarm can occur when the ADM on the other end has not provisioned the SPE. An UNEQ-P alarm sets the STS SPE to all zeros when it is provisioned. If the alarm occurs, the problem is probably with the configuration of the ADM. Since the UNEQ-P is not a common alarm reported by Juniper Networks routers, it is a good idea to first check with the SONET provider.

- Related Documentation**
- [List of Common SONET Alarms and Errors on page 149](#)
 - [Display SONET Alarms and Errors on page 151](#)
 - [Locate Most Common SONET Alarms and Errors on page 154](#)
 - [Locate Loss of Signal Alarms on page 155](#)
 - [Locate Alarm Indication Signal Alarms on page 156](#)
 - [Locate Remote Defect Indication Alarms on page 158](#)

- [Locate Remote Error Indication Line Errors on page 160](#)
- [Locate Bit Error Rate Alarms on page 163](#)
- [Locate Payload Label Mismatch Path Alarms on page 164](#)
- [Locate Loss of Pointer Path Alarms on page 167](#)
- [Locate Phase Lock Loop Alarms on page 170](#)

Locate Phase Lock Loop Alarms

Problem The phase lock loop (PLL) alarm occurs when the PLL cannot lock on to a timing device, and indicates a possible hardware or network timing problem.

Solution To display SONET alarms and errors, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces so-fpc/pic/port extensive
```

Sample Output user@host> show interfaces so-1/1/1 extensive
[...Output truncated...]

```
Active alarms : PLL
Active defects : PLL
SONET PHY:
  PLL Lock      26      0 PLL Lock Error
  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      3      3 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
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
[...Output truncated...]
```

Meaning The sample output shows a PLL alarm lasting for 26 seconds. You must investigate the timing source to diagnose the problem. The timing source is derived from an incoming SONET circuit (when **clock external** is configured), or from the onboard Stratum 3 clock (when **clock internal** is configured). Internal clocking is the default for Juniper Networks routers.

The cause of the problem differs depending on the type of system board on the router. (See [Table 36 on page 171](#).) For example:

- On the M20 and M40 Internet router OC48-SM-IR PIC and the M160 Internet router OC192 board, the problem might be caused by the following:
- An out-of-tolerance clock coming from the far end, if clocking external is configured.
- An out-of-tolerance clock coming from the far end or a problem with the board being unable to lock on to its internal clock to derive the transmit clock, if clocking internal is configured.
- On OC3 and OC12 PICs, the PIC not establishing a lock to the onboard clock to derive the outgoing clock.

To further diagnose the problem, try the following:

- Configure clocking to external. If the alarm disappears, the board might not have locked to the internal clock used to derive the outgoing clock.
- Configure clocking to internal and make sure that a loopback fiber is plugged in. If the PLL alarm persists, it is most likely a hardware problem. However, you may not be able to determine if the direction is on the inbound or outbound side of the board.

[Table 36 on page 171](#) shows the location of the onboard clock on the various system boards of Juniper Networks routers.

Table 36: Location of the Onboard Clock

Router	System Board
M5, M10, M20, and M40 routers	System Control Board (SCB), System and Switch Board (SSB), Switching and Forwarding Module (SFM), and Single Board Router (SBR)
OC48-SM-IR PIC used on the M20 and M40 routers	Flexible PIC Concentrator (FPC)
M40e and M160 routers	Miscellaneous Control Subsystem (MCS)
T-series routing platforms	SONET Clock Generator (SCG)

**Related
Documentation**

- [List of Common SONET Alarms and Errors on page 149](#)
- [Display SONET Alarms and Errors on page 151](#)
- [Locate Most Common SONET Alarms and Errors on page 154](#)
- [Locate Loss of Signal Alarms on page 155](#)
- [Locate Alarm Indication Signal Alarms on page 156](#)
- [Locate Remote Defect Indication Alarms on page 158](#)
- [Locate Remote Error Indication Line Errors on page 160](#)
- [Locate Bit Error Rate Alarms on page 163](#)
- [Locate Payload Label Mismatch Path Alarms on page 164](#)
- [Locate Loss of Pointer Path Alarms on page 167](#)
- [Locate Unequipped Payload Alarms on page 168](#)

CHAPTER 16

Enable SONET Payload Scrambling

This chapter describes SONET payload scrambling and how to check and configure it.

- [Checklist for Enabling SONET Payload Scrambling on page 173](#)
- [Understand SONET Payload Scrambling on page 173](#)

Checklist for Enabling SONET Payload Scrambling

[Table 37 on page 173](#) provides links and commands for SONET payload scrambling and how to check and configure it.

Table 37: Checklist for Enabling SONET Payload Scrambling

Tasks	Command or Action
“Understand SONET Payload Scrambling” on page 173	
1. Check SONET HDLC Payload Scrambling on page 174	<code>show configuration interfaces interface-name</code> <code>show interfaces interface-name</code>
2. Configure SONET HDLC Payload Scrambling on page 175	<code>[edit]</code> <code>edit interfaces so-fpc/pic/port sonet-options</code> <code>set payload-scrambler</code> <code>show</code> <code>commit</code>

Related Documentation • [Understand SONET Payload Scrambling on page 173](#)

Understand SONET Payload Scrambling

SONET payload scrambling preserves data integrity. Scrambling is designed to randomize the digital bits (pattern of 1s and 0s) carried in the Asynchronous Transfer Mode (ATM) cells (physical layer frame). Randomizing the digital bits can prevent continuous, long strings of all 1s or all 0s. Transitions between 1s and 0s are used by some physical layer protocols to maintain clocking. SONET interfaces support two levels of scrambling, as follows:

- SONET frame scrambling mode required by the International Telecommunications Union Telecommunication Standardization (ITU-T) GR-253 standard. This mode uses

a $1 + x^6 + x^7$ algorithm to scramble the section overhead of the SONET frame. It does not scramble the first row of the section overhead.

- Cell payload scrambling is optional and is defined in ITU-T I.432, section 4.5.3. This mode randomizes the bits in the payload portion of an ATM cell to make sure that the beginning of each new cell is recognized. It leaves the 5-byte header unscrambled.

Synchronous Transport System (STS) stream scrambling must be enabled on every SONET device and is the default for SONET interfaces.

Cell payload scrambling or SONET High-level Data Link Control (HDLC) scrambling can be enabled or disabled, and on Juniper routers is enabled by default to provide better link stability. Both sides of a connection must either use scrambling or not use it.



NOTE: HDLC payload scrambling conflicts with traffic shaping configured using leaky bucket properties. If you configure leaky bucket properties, you must disable payload scrambling because the software rejects configurations that have both features enabled. For more information, see the *Junos Network Interfaces Configuration Guide*.

On a Channelized OC12 interface, the SONET **payload-scrambler** statement is ignored. To configure scrambling on the DS3 channels on the interface, include the **t3-options payload-scrambler** statement in the configuration for each DS3 channel.

1. [Check SONET HDLC Payload Scrambling on page 174](#)
2. [Configure SONET HDLC Payload Scrambling on page 175](#)

Check SONET HDLC Payload Scrambling

Purpose If you find that payload scrambling is not enabled, you might want to enable or configure it because it provides better link stability when it is working.

Action In the Junos OS command-line interface (CLI) operational mode, you can use one of the following two commands to check for SONET HDLC control payload scrambling:

```
user@host> show configuration interfaces | interface-name
```

or

```
user@host> show interfaces interface-name
```

Sample Output 1

```
user@host> show configuration interfaces so-0/0/0
encapsulation cisco-hdlc;
sonet-options {
    payload-scrambler;
}
unit 0 {
    family inet {
        address 9.0.0.2/32 {
            destination 9.0.0.1;
        }
    }
}
```

```

    family mpls;
}

```

Sample Output 2

```

user@host> show configuration interfaces so-0/0/0
encapsulation cisco-hdlc;
sonet-options {
    no-payload-scrambler;
}
unit 0 {
    family inet {
        address 9.0.0.2/32 {
            destination 9.0.0.1;
        }
    }
    family mpls;
}

```

Sample Output 3

```

user@host> show interfaces so-0/0/1
Physical interface: so-0/0/1, Enabled, Physical link is Up
  Interface index: 48, SNMP ifIndex: 114
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC3,
  Loopback: None, FCS: 32,
  Payload scrambler: Disabled
  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: 70627 (00:00:07 ago), Output: 70791 (00:00:08 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Opened, mpls: Not-configured

  Input rate      : 78056456 bps (6504 pps)
  Output rate     : 78044840 bps (6503 pps)
  SONET alarms    : None
  SONET defects   : None
  Logical interface so-0/0/1.0 (Index 61) (SNMP ifIndex 118)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470, Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 192.168.50.0/30, Local: 192.168.50.1
    Protocol iso, MTU: 4470, Flags: None

```

Meaning Sample output 1 shows that the SONET interface payload scrambling has been enabled.

Sample output 2 shows that HDLC payload scrambling has been disabled. If you use the **show configuration** or **show configuration interfaces** command, you must scroll to the particular interface for payload scrambling status.

Sample output 3 shows that payload scrambling has been disabled. To explicitly configure payload scrambling, see [“Configure SONET HDLC Payload Scrambling” on page 175](#).

Configure SONET HDLC Payload Scrambling

Purpose You might want to configure SONET HDLC payload scrambling (which is the configurable cell payload scrambling mentioned earlier) if it has been disabled. Configuring payload scrambling provides better link stability.



NOTE: Payload scrambling is the default for Juniper Networks routers. To return to the default, that is, to re-enable payload scrambling, delete the `no-payload-scrambler` statement from the configuration.

Action To explicitly configure HDLC payload scrambling, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces so-fpc/pic/port sonet-options
```
2. Configure payload scrambling:

```
[edit interfaces so-fpc/pic/port sonet-options]
user@host# set payload-scrambler
```
3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces so-0/0/0 sonet-options]
user@host# show
payload-scrambler;
```
4. Commit the configuration:

```
user@host# commit
```

Related Documentation

- [Checklist for Enabling SONET Payload Scrambling on page 173](#)

Check the SONET Frame Checksum

This chapter describes the SONET frame checksum and how to check and configure it.

- [Checklist for Checking the SONET Frame Checksum on page 177](#)
- [Understand the SONET Frame Checksum on page 178](#)
- [Check the SONET Frame Checksum on page 178](#)
- [Configure a SONET Frame Checksum on page 182](#)

Checklist for Checking the SONET Frame Checksum

Purpose To check and configure SONET frame checksum.

Action [Table 38 on page 177](#) provides the links and commands for SONET frame checksum.

Table 38: Checklist for Checking the SONET Frame Checksum

Tasks	Command or Action
“Understand the SONET Frame Checksum” on page 178	
“Check the SONET Frame Checksum” on page 178	
1. Examine Output for Framing Errors on page 178	<code>show interfaces <i>interface-name</i> extensive</code>
2. Check the FCS Configuration on page 181	<code>show configuration interfaces <i>interface-name</i></code> <code>show interfaces <i>interface-name</i></code>
“Configure a SONET Frame Checksum” on page 182	
1. Return to the Default 16-Bit Checksum on page 182	<code>[edit]</code> <code>edit interfaces <i>so-fpc/pic/port</i> sonet-options</code> <code>delete fcs 32</code> <code>show</code> <code>commit</code>
2. Configure a 16-Bit Checksum on page 183	<code>[edit]</code> <code>edit interfaces <i>so-fpc/pic/port</i> sonet-options</code> <code>set fcs 16</code> <code>show</code> <code>commit</code>

Table 38: Checklist for Checking the SONET Frame Checksum (*continued*)

Tasks	Command or Action
3. Configure a 32-Bit Checksum on page 183	<pre>[edit] edit interfaces so-fpc/pic/port sonet-options set (fcs 32 rfc-2615) show commit</pre>

- Related Documentation**
- [Check the SONET Frame Checksum on page 178](#)
 - [Configure a SONET Frame Checksum on page 182](#)

Understand the SONET Frame Checksum

Problem The SONET frame checksum is a calculation that is added to a frame for error control purposes. SONET frame checksum is used in High-Level Data Link Control (HDLC), Frame Relay, and other data-link layer protocols. For example, Router A calculates the frame check sequence (FCS) and adds it to the outgoing message. Router B, on receiving the message recalculates the FCS and compares it to the FCS from Router A. If there is a difference, both sides of the connection might not match in relation to the FCS configuration.

Solution This chapter describes the following tasks:

- [Check the SONET Frame Checksum on page 178](#)
- [Configure a SONET Frame Checksum on page 182](#)

Check the SONET Frame Checksum

If you are having problems with a connection, check that the FCS matches on both sides of the connection.

To check the SONET frame checksum, follow these steps:

1. [Examine Output for Framing Errors on page 178](#)
2. [Check the FCS Configuration on page 181](#)

Examine Output for Framing Errors

Purpose By examining the output for an interface, you can determine if framing errors are incrementing in the absence of any SONET alarms or defects.

Action From the Junos OS command-line interface (CLI) operational mode, use the following command to check for framing errors:

```
user@host> show interfaces interface-name extensive
```

Sample Output user@router1> show interfaces so-1/0/0 extensive


```

Physical interface: so-1/0/0, Enabled, Physical link is Up
  Interface index: 13, SNMP ifIndex: 18, Generation: 12
  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: Link-Layer-Down 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 : 6 (last seen 00:00:52 ago)
    Output: 11 (last sent 00:00:05 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Opened, mpls: Conf-req-sent

  CHAP state: Not-configured
  Last flapped : 2002-11-01 22:28:30 UTC (1w5d 23:26 ago)
  Statistics last cleared: 2002-11-14 21:52:51 UTC (00:01:50 ago)
  Traffic statistics:
    Input bytes :          692          0 bps
    Output bytes :          716         32 bps
    Input packets:           23          0 pps
    Output packets:          72          0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 27 , 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         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
  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       : 0xcf, C2(cmp) : 0xcf, 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       : 0xcf, F2       : 0x00, Z3       : 0x00
Z4       : 0x00, V5       : 0x00
Received path trace: router2 so-1/3/1
73 6c 69 70 70 65 72 79 20 73 6f 2d 31 2f 33 2f  router2 so-1/3/1
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 0d 0a .....
Transmitted path trace: router1 so-1/0/0
68 61 69 72 79 20 73 6f 2d 31 2f 30 2f 30 00 00  router1 so-1/0/0
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 .....
HDLCD configuration:
Policing bucket: Disabled
Shaping bucket : Disabled
Giant threshold: 4484, Runt threshold: 3
Packet Forwarding Engine configuration:
Destination slot: 1, PLP byte: 1 (0x00)
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-1/0/0.0 (Index 8) (SNMP ifIndex 108) (Generation 9)
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: PPP
Protocol inet, MTU: 4470, Generation: 15, Route table: 1
Flags: Is-Primary
Addresses, Flags: Dest-route-down Is-Default Is-Preferred Is-Primary
Destination: 1.1.6.1, Local: 1.1.6.2, Broadcast: Unspecified, Generation:
15
Protocol iso, MTU: 4470, Generation: 16, Route table: 1
Flags: Is-Primary
Protocol mpls, MTU: 4458, Generation: 17, Route table: 1
Flags: Protocol-Down, Is-Primary

```

Meaning The sample output shows that Router 1 is configured for FCS 16, that framing errors have incremented to 27, and that there are no SONET alarms or defects. Incrementing framing errors, in the absence of any SONET alarms or defects, are a symptom of SONET frame checksum errors.

Check the FCS Configuration

Purpose If you are having problems with a connection, check your router's FCS configuration and, if possible, the FCS configuration on the router on the other side of the connection.

Action From the Junos OS CLI operational mode, use one of the following two commands to check the SONET frame checksum:

```
user@host> show configuration interfaces |interface-name
```

or

```
user@host> show interfaces interface-name
```



NOTE: The option to display a specific configuration with the `show configuration` command hierarchy was introduced in Junos OS Release 5.3.

Sample Output 1 `user@host> show configuration interfaces so-0/0/0`

```
encapsulation cisco-hdlc;
sonet-options {
  fcs 32;
    payload-scrambler;
}
unit 0 {
  family inet {
    address 9.0.0.2/32 {
      destination 9.0.0.1;
    }
  }
  family mpls;
}
```

Sample Output 2 `user@host> show interfaces so-0/0/1`

```
Physical interface: so-0/0/1, Enabled, Physical link is Up
  Interface index: 48, SNMP ifIndex: 114
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC3,
  Loopback: None, FCS: 32,
    Payload scrambler: Disabled
  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: 70627 (00:00:07 ago), Output: 70791 (00:00:08 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Opened, mpls: Not-configured

  Input rate      : 78056456 bps (6504 pps)
  Output rate     : 78044840 bps (6503 pps)
  SONET alarms    : None
  SONET defects   : None
  Logical interface so-0/0/1.0 (Index 61) (SNMP ifIndex 118)
    Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
    Protocol inet, MTU: 4470, Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
```

Destination: 192.168.50.0/30, Local: 192.168.50.1
Protocol iso, MTU: 4470, Flags: None

Meaning Sample output 1 shows that FCS 32 is configured. If you use the **show configuration** or **show configuration interfaces** command, you must scroll to the particular interface for the FCS configuration status.

Meaning Sample output 2 shows that FCS 32 is configured. To change the FCS configuration, see [“Return to the Default 16-Bit Checksum” on page 182](#), [“Configure a 16-Bit Checksum” on page 183](#), or [“Configure a 32-Bit Checksum” on page 183](#).

Related Documentation

- [Checklist for Checking the SONET Frame Checksum on page 177](#)
- [Configure a SONET Frame Checksum on page 182](#)

Configure a SONET Frame Checksum

After you have checked the FCS and determined that a problem exists, you might need to do one of the following, depending on the situation:



NOTE: By default, SONET interfaces use a 16-bit frame checksum. You can configure a 32-bit checksum, which provides more reliable packet verification. However, some older equipment may not support 32-bit checksums.

- [Return to the Default 16-Bit Checksum on page 182](#)
- [Configure a 16-Bit Checksum on page 183](#)
- [Configure a 32-Bit Checksum on page 183](#)

Return to the Default 16-Bit Checksum

Action To return to the default 16-bit frame checksum, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]  
user@host# edit interfaces so-fpc/pic/port sonet-options
```
2. Delete the **fcs 32** statement from the configuration:

```
[edit]  
user@host# delete fcs 32
```
3. Verify the deletion:

```
user@host# show
```
4. Commit the configuration:

```
user@host# commit
```

Configure a 16-Bit Checksum

Action To explicitly configure the 16-bit checksum, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces so-fpc/pic/port sonet-options
```

2. Configure the 16-bit checksum:

```
[edit interfaces so-fpc/pic/port sonet-options]
user@host# set fcs 16
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces so-0/0/0 sonet-options]
user@host# show
fcs 16;
```

4. Commit the configuration:

```
user@host# commit
```

Configure a 32-Bit Checksum

Action To explicitly configure the 32-bit checksum, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces so-fpc/pic/port sonet-options
```

2. Configure the 32-bit checksum:

```
[edit interfaces so-fpc/pic/port sonet-options]
user@host# set (fcs 32 | rfc-2615)
```



NOTE: The rfc-2615 statement automatically configures the interface to use FCS 32 and changes the C2 byte to 0x16, as per the RFC.

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces so-0/0/0 sonet-options]
user@host# show
fcs 32;
```

or

```
[edit interfaces so-0/0/0 sonet-options]
user@host# show
```

rfc-2615;

1. Commit the configuration:

user@host# commit



NOTE: On a Channelized OC12 interface, the `sonet-options 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.

**Related
Documentation**

- [Checklist for Checking the SONET Frame Checksum on page 177](#)
- [Check the SONET Frame Checksum on page 178](#)

PART 6

Investigate Fast Ethernet and Gigabit Ethernet Interfaces

- [Monitor Fast Ethernet and Gigabit Ethernet Interfaces on page 187](#)
- [Use Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces on page 197](#)
- [Locate the Fast Ethernet and Gigabit Ethernet LINKAlarm and Counters on page 209](#)

Monitor Fast Ethernet and Gigabit Ethernet Interfaces

This chapter describes how to monitor Fast Ethernet and Gigabit Ethernet interfaces, and begin the process of isolating Fast Ethernet and Gigabit Ethernet interface problems when they occur.

- [Checklist for Monitoring Fast Ethernet and Gigabit Ethernet Interfaces on page 187](#)
- [Monitor Fast Ethernet and Gigabit Ethernet Interfaces on page 188](#)
- [Fiber-Optic Ethernet Interface Specifications on page 195](#)

Checklist for Monitoring Fast Ethernet and Gigabit Ethernet Interfaces

- Purpose** To monitor Fast Ethernet and Gigabit Ethernet interfaces and begin the process of isolating interface problems when they occur.
- Action** [Table 39 on page 187](#) provides links and commands for monitoring Fast Ethernet and Gigabit Ethernet interfaces.

Table 39: Checklist for Monitoring Fast Ethernet and Gigabit Ethernet Interfaces

Tasks	Command or Action
“Monitor Fast Ethernet and Gigabit Ethernet Interfaces” on page 188	
1. Display the Status of Fast Ethernet Interfaces on page 188	<code>show interfaces terse (fe* ge*)</code>
2. Display the Status of a Specific Fast Ethernet or Gigabit Ethernet Interface on page 190	<code>show interfaces (fe-fpc/pic/port ge-fpc/pic/port)</code>
3. Display Extensive Status Information for a Specific Fast Ethernet or Gigabit Ethernet Interface on page 191	<code>show interfaces (fe-fpc/pic/port ge-fpc/pic/port) extensive</code>
4. Monitor Statistics for a Fast Ethernet or Gigabit Ethernet Interface on page 194	<code>monitor interface (fe-fpc/pic/port ge-fpc/pic/port)</code>
5. Fiber-Optic Ethernet Interface Specifications on page 195	

Meaning You can use the above described commands to monitor and to display the configurations for Fast Ethernet and Gigabit Ethernet interfaces.

Related Documentation

- [Display the Status of Gigabit Ethernet Interfaces on page 189](#)
- [Display the Status of Fast Ethernet Interfaces on page 188](#)

Monitor Fast Ethernet and Gigabit Ethernet Interfaces

By monitoring Fast Ethernet and Gigabit Ethernet interfaces, you begin to isolate Fast Ethernet and Gigabit Ethernet interface problems when they occur.

To monitor your Fast Ethernet and Gigabit Ethernet interfaces, follow these steps:

1. [Display the Status of Fast Ethernet Interfaces on page 188](#)
2. [Display the Status of Gigabit Ethernet Interfaces on page 189](#)
3. [Display the Status of a Specific Fast Ethernet or Gigabit Ethernet Interface on page 190](#)
4. [Display Extensive Status Information for a Specific Fast Ethernet or Gigabit Ethernet Interface on page 191](#)
5. [Monitor Statistics for a Fast Ethernet or Gigabit Ethernet Interface on page 194](#)

Display the Status of Fast Ethernet Interfaces

Purpose To display the status of Fast Ethernet interfaces, use the following Junos OS command-line interface (CLI) operational mode command:

Action `user@host> show interfaces terse (fe* | ge*)`

Sample Output

```
user@host> show interfaces terse fe*
Interface      Admin Link Proto Local Remote
fe-2/1/0       up    up
fe-2/1/0.0     up    up   inet  10.116.115.217/29
fe-3/0/2       up    down
fe-3/0/2.0     up    down
fe-3/0/3       up    up
fe-3/0/3.0     up    up   inet  192.168.223.65/30
fe-4/1/0       down  up
fe-4/1/0.0     up    down inet  10.150.59.133/30
fe-4/1/1       up    up
fe-4/1/1.0     up    up   inet  10.150.59.129/30
fe-4/1/2       up    down
fe-4/1/2.0     up    down
```

Meaning The sample output lists only the Fast Ethernet interfaces. It shows the status of both the physical and logical interfaces. For a description of what the output means, see [Table 40 on page 189](#).

Table 40: Status of Fast Ethernet Interfaces

Physical Interface	Logical Interface	Status Description
fe-2/1/0	fe-2/1/0.0	This interface has both the physical and logical links up and running.
Admin Up	Admin Up	
Link Up	Link Up	
fe-3/0/2	fe-3/0/2.0	This interface has the physical link down, the link layer down, or both down (Link Down). The logical link is also down as a result.
Admin Up	Admin Up	
Link Down	Link Down	
fe-4/1/0	fe-4/1/0.0	This interface is administratively disabled and the physical link is healthy (Link Up), but the logical interface is not established. The logical interface is down because the physical link is disabled.
Admin Down	Admin Up	
Link Up	Link Down	
fe-4/1/2	fe-4/1/2.0	This interface has both the physical and logical links down.
Admin Up	Admin Up	
Link Down	Link Down	

Display the Status of Gigabit Ethernet Interfaces

Purpose To display the status of Gigabit Ethernet interfaces, use the following Junos OS command-line interface (CLI) operational mode command:

Sample Output

```

user@host> show interfaces terse ge*
Interface      Admin Link Proto Local Remote
ge-2/2/0       down  down
ge-2/2/0.0     up    down inet  65.113.23.105/30
ge-2/3/0       up    up
ge-2/3/0.0     up    up   inet  65.115.56.57/30
ge-3/1/0       up    up
ge-3/1/0.0     up    up   inet  65.115.56.193/30
ge-3/2/0       up    down

```

Meaning This sample output lists only the Gigabit Ethernet interfaces. It shows the status of both the physical and logical interfaces. See [Table 41 on page 190](#) for a description of what the output means.

Table 41: Status of Gigabit Ethernet Interfaces

Physical Interface	Logical Interface	Status Description
ge-2/2/0	ge-2/2/0.0	This interface is administratively disabled (Admin Down). Both the physical and logical links are down (Link Down).
Admin Down	Admin Up	
Link Down	Link Down	
ge-2/3/0	ge-2/3/0.0	This interface has both the physical and logical links up and running.
Admin Up	Admin Up	
Link Up	Link Up	
ge-3/2/0	ge-3/2/0.0	This interface has both the physical link and the logical interface down.
Admin Up	Admin Up	
Link Down	Link Down	

Display the Status of a Specific Fast Ethernet or Gigabit Ethernet Interface

Purpose To display the status of a specific Fast Ethernet or Gigabit Ethernet interface when you need to investigate its status further, use the following Junos OS CLI operational mode command:

Action `user@host> show interfaces (fe-fpc/pic/port | ge-fpc/pic/port)`

Sample Output 1 The following sample output is for a Fast Ethernet interface with the physical link up:

```
user@host> show interfaces fe-2/1/0
Physical interface: fe-2/1/0, Enabled, Physical link is Up
  Interface index: 31, SNMP ifIndex: 35
  Description: customer connection
  Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
  Speed: 100mbps, Loopback: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Link flags     : None
  Current address: 00:90:69:86:71:1b, Hardware address: 00:90:69:86:71:1b
  Input rate     : 25768 bps (11 pps), Output rate: 1576 bps (3 pps)
  Active alarms  : None
  Active defects : None
  Logical interface fe-2/1/0.0 (Index 2) (SNMP ifIndex 43)
    Flags: SNMP-Traps, Encapsulation: ENET2
    Protocol inet, MTU: 1500, Flags: Is-Primary
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.116.151.218/29, Local: 10.119.115.217
        Broadcast: 10.116.151.225
```

Sample Output 2 The following output is for a Gigabit Ethernet interface with the physical link up:

```
user@host> show interfaces ge-3/1/0
Physical interface: ge-3/1/0, Enabled, Physical link is Up
```

```

Interface index: 41, SNMP ifIndex: 55
Description: customer connection
Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
Speed: 1000mbps, Loopback: Disabled, Flow control: Enabled
Device flags : Present Running
Interface flags: SNMP-Traps
Link flags : None
Current address: 00:90:69:85:71:99, Hardware address: 00:90:69:85:71:99
Input rate : 7412216 bps (1614 pps), Output rate: 2431184 bps (1776 pps)
Active alarms : None
Active defects : None
Logical interface ge-3/1/0.0 (Index 11) (SNMP ifIndex 57)
  Flags: SNMP-Traps, Encapsulation: ENET2
  Protocol inet, MTU: 1500
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 10.117.65.192/30, Local: 10.115.65.193
      Broadcast: 10.115.65.195

```

Meaning The first line of sample output 1 and 2 shows that the physical link is up. This means that the physical link is healthy and can pass packets. Further down the sample output, look for active alarms and defects. If you see active alarms or defects, to further diagnose the problem, see Step 3, [“Display Extensive Status Information for a Specific Fast Ethernet or Gigabit Ethernet Interface” on page 191](#), to display more extensive information about the Fast Ethernet interface and the physical interface that is down.

Display Extensive Status Information for a Specific Fast Ethernet or Gigabit Ethernet Interface

Purpose To display extensive status information about a specific Fast Ethernet or Gigabit Ethernet interface, use the following Junos OS CLI operational mode command:

Action `user@host> show interfaces (fe-fpc/pic/port | ge-fpc/pic/port) extensive`

Sample Output The following sample output is for a Fast Ethernet interface:

```

user@router> show interfaces fe-1/3/3 extensive
Physical interface: fe-1/3/3, Enabled, Physical link is Up
Interface index: 47, SNMP ifIndex: 38
Description: Test
Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
Speed: 100mbps, Loopback: Disabled, Flow control: Enabled
Device flags : Present Running
Interface flags: SNMP-Traps
Link flags : None
Current address: 00:90:69:8d:2c:de, Hardware address: 00:90:69:8d:2c:de
Statistics last cleared: 2002-01-11 23:03:09 UTC (1w2d 23:54 ago)
Traffic statistics:
Input bytes :          373012658          0 bps
Output bytes :          153026154        1392 bps
Input packets:          1362858          0 pps
Output packets:         1642918          3 pps
Input errors:
Errors: 0 , Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 503660
L3 incompletes: 1 , L2 channel errors: 0 , L2 mismatch timeouts: 0
FIFO errors: 0
Output errors:
Carrier transitions: 0, Errors: 0, Collisions: 0, Drops: 0, Aged packets: 0
HS link CRC errors: 0, FIFO errors: 0
Active alarms : None

```

```

Active defects : None
MAC statistics:
  Receive      Transmit
Total octets   439703575  177452093
Total packets  1866532   1642916
Unicast packets  972137   1602563
Broadcast packets  30       2980
Multicast packets  894365   37373
CRC/Align errors  0         0
FIFO errors       0         0
MAC control frames  0         0
MAC pause frames  0         0
Oversized frames  0         0
Jabber frames     0         0
Fragment frames   0         0
VLAN tagged frames  0         0
Code violations   0         0
Filter statistics:
Input packet count  1866532
Input packet rejects  0
  Input DA rejects  503674
  Input SA rejects  0
Output packet count  1642916
Output packet pad count  0
Output packet error count  0
CAM destination filters: 5, CAM source filters: 0
Autonegotiation information:
  Negotiation status: Complete, Link partner status: OK
  Link partner: Full-duplex, Flow control: None
PFE configuration:
  Destination slot: 1, Stream number: 15
  CoS transmit queue bandwidth:
    Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
  CoS weighted round-robin:
    Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
Logical interface fe-1/3/3.0 (Index 8) (SNMP ifIndex 69)
  Description: Test
  Flags: SNMP-Traps, Encapsulation: ENET2
  Protocol inet, MTU: 1500, Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.115.107.192/29, Local: 10.115.107.193
    Broadcast: 10.115.107.199

```

Meaning The sample output shows where the errors might be occurring and includes autonegotiation information. See [Table 42 on page 192](#) for a description of errors to look for.

Table 42: Errors to Look For

Error	Meaning
Policed discards	Discarded frames that were not recognized or were not of interest.
L2 channel errors	Packets for which the router could not find a valid logical interface. For example, the packet is for a virtual LAN (VLAN) that is not configured on the interface.
MTU	The maximum transmission unit (MTU) must match the interface of either the router at the remote end of the Fast Ethernet or Gigabit Ethernet link, or that of the switch.

Table 42: Errors to Look For (*continued*)

Error	Meaning
Input DA rejects	Number of packets with a destination Media Access Control (MAC) address that is not on the accept list. It is normal to see this number increment.
Input SA rejects	Number of packets with a source MAC address that is not on the accept list. This number only increments when source MAC address filtering is configured.

If the physical link is down, look at the active alarms and defects for the Fast Ethernet or Gigabit Ethernet interface and diagnose the Fast Ethernet or Gigabit Ethernet media accordingly. See “[Checklist for Locating Fast Ethernet and Gigabit Ethernet Alarms and Counters](#)” on page 209 for an explanation of Fast Ethernet and Gigabit Ethernet alarms.

[Table 43 on page 193](#) lists and describes some MAC statistics errors to look for.

Table 43: MAC Statistics Errors

Error	Meaning
CRC/Align errors	The total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
MAC control frames	The number of MAC control frames.
MAC pause frames	The number of MAC control frames with pause operational code.
Jabber frames	<p>The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error.</p> <p>Note that this definition of jabber is different from the definition in IEEE-802.3 section 8.2.1.5 (10BASE5) and section 10.3.1.4 (10BASE2). These documents define jabber as the condition where any packet exceeds 20 ms. The allowed range to detect jabber is between 20 ms and 150 ms.</p>
Fragment frames	<p>The total number of packets received that were less than 64 octets in length (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error.</p> <p>Note that it is entirely normal for fragment frames to increment because both runts (which are normal occurrences due to collisions) and noise hits are counted.</p>

Autonegotiation is the process that connected Ethernet interfaces use to communicate the information necessary to interoperate. [Table 44 on page 193](#) explains the autonegotiation information of the **show interface *interface-name* extensive** command output.

Table 44: Autonegotiation Information

Autonegotiation Field Information	Explanation
Negotiation status: Incomplete	The Negotiation status field shows Incomplete when the Ethernet interface has the speed or link mode configured.

Table 44: Autonegotiation Information (*continued*)

Autonegotiation Field Information	Explanation
Negotiation status: No autonegotiation	The Negotiation status field shows No autonegotiation when the remote Ethernet interface has the speed or link mode configured, or does not perform autonegotiation.
Negotiation status: Complete Link partner status: OK	The Negotiation status field shows Complete and the Link partner field shows OK when the Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process completes successfully.
Link partner: Half-duplex	The Link partner field can be Full-duplex or Half-duplex depending on the capability of the attached Ethernet device.
Flow control: Symmetric/asymmetric	The Flow control field displays the types of flow control supported by the remote Ethernet device.

Monitor Statistics for a Fast Ethernet or Gigabit Ethernet Interface

Purpose To monitor statistics for a Fast Ethernet or Gigabit Ethernet interface, use the following Junos OS CLI operational mode command:

Action `user@host> monitor interface (fe-fpc/pic/port | ge-fpc/pic/port)`



CAUTION: We recommend that you use the `monitor interface fe-fpc/pic/port` or `monitor interface ge-fpc/pic/port` command only for diagnostic purposes. Do not leave these commands on during normal router operations because real-time monitoring of traffic consumes additional CPU and memory resources.

Sample Output The following sample output is for a Fast Ethernet interface:

```

user@host> monitor interface fe-2/1/0
Interface: fe-2/1/0, Enabled, Link is Up
Encapsulation: Ethernet, Speed: 100mbps
Traffic statistics:
  Input bytes:          282556864218 (14208 bps)      [40815]
  Output bytes:         42320313078 (384 bps)        [890]
  Input packets:        739373897 (11 pps)           [145]
  Output packets:       124798688 (1 pps)            [14]
Error statistics:
  Input errors:          0                          [0]
  Input drops:           0                          [0]
  Input framing errors:  0                          [0]
  Policed discards:      6625892                     [6]
  L3 incompletes:        75                          [0]
  L2 channel errors:     0                          [0]
  L2 mismatch timeouts:  0                          [0]
  Carrier transitions:   1                          [0]
  Output errors:         0                          [0]
  Output drops:          0                          [0]
  Aged packets:         0                          [0]

```



```

Active alarms : None
Active defects: None
Input MAC/Filter statistics:
  Unicast packets          464751787      [154]
  Packet error count       0              [0]

```

Meaning Use the 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.

The statistics in the second column are the cumulative statistics since the last time they were cleared using the `clear interfaces statistics interface-name` command. The statistics in the third column are the cumulative statistics since the `monitor interface interface-name` command was executed.

If the input errors are increasing, verify the following:

1. Check the cabling to the router and have the carrier verify the integrity of the line. To verify the integrity of the cabling, make sure that you have the correct cables for the interface port. Make sure you have single-mode fiber cable for a single-mode interface and multimode fiber cable for a multimode interface.
2. For a fiber-optic connection, measure the received light level at the receiver end and make sure that it is within the receiver specification of the Ethernet interface. See [Table 45 on page 195](#) for the fiber-optic Ethernet interface specifications.
3. Measure the transmit light level on the Tx port to verify that it is within specification. See [Table 45 on page 195](#) for the optical specifications.

Fiber-Optic Ethernet Interface Specifications

[Table 45 on page 195](#) shows the specifications for fiber-optic interfaces for Juniper Networks routers.

Table 45: Fiber-Optic Ethernet Interface Specifications

Fiber-Optic Ethernet Interface	Length	Wavelength	Average Launch Power	Receiver Saturation	Receiver Sensitivity
Gigabit Ethernet					
Duplex SC connector					
LH optical interface	49.5-mile 70-km reach on 8.2-micrometer SMF	1480 to 1580 nm	-3 to +2 dBm	-3 dBm	-23 dBm (BER 10 ⁻¹²) for SMF

Table 45: Fiber-Optic Ethernet Interface Specifications (*continued*)

Fiber-Optic Ethernet Interface	Length	Wavelength	Average Launch Power	Receiver Saturation	Receiver Sensitivity
LX optical interface	6.2-mile 10-km reach on 9/125-micrometer SMF 1804.5-ft 550-m reach on 62.5/125- and 50/125-micrometer MMF	1270 to 1355 nm	-11 to -3 dBm	-3 dBm	-19 dBm
SX optical interface	656-ft 200-m reach on 62.5/125-micrometer MMF 1640-ft 500-m reach on 50/125-micrometer MMF	830 to 860 nm	-9.5 to -4 dBm	-3 dBm	-17 dBm
Fast Ethernet 8-Port					
FX optical interface with MT-RJ connector	1.24-mile 2-km reach on 62.5/125-micrometer MMF	1270 to 1380 nm	-20 to -14 dBm	-14 dBm	-34 dBm

CHAPTER 19

Use Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces

This chapter describes the steps you take to isolate Fast Ethernet and Gigabit Ethernet interface problems.

- [Checklist for Using Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces on page 197](#)
- [Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface on page 198](#)
- [Create a Loopback on page 199](#)
- [Verify That the Fast Ethernet or Gigabit Ethernet Interface Is Up on page 201](#)
- [Configure a Static Address Resolution Protocol Table Entry on page 202](#)
- [Clear Fast Ethernet or Gigabit Ethernet Interface Statistics on page 204](#)
- [Ping the Fast Ethernet or Gigabit Ethernet Interface on page 204](#)
- [Check for Fast Ethernet or Gigabit Ethernet Interface Error Statistics on page 205](#)
- [Diagnose a Suspected Circuit Problem on page 207](#)

Checklist for Using Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces

Purpose	To use loopback testing to isolate Fast Ethernet and Gigabit Ethernet interface problems.
Action	Table 46 on page 197 provides links and commands for using loopback testing for Fast Ethernet and Gigabit Ethernet interfaces.

Table 46: Checklist for Using Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces

Tasks	Command or Action
“Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface” on page 198	
1. Create a Loopback on page 199	
a. Create a Physical Loopback for a Fiber-Optic Interface on page 199	Connect the transmit port to the receive port.
b. Create a Loopback Plug for an RJ-45 Ethernet Interface on page 199	Cross pin 1 (TX+) and pin 3 (RX+) together, and pin 2 (TX-) and pin 6 (RX-) together.

Table 46: Checklist for Using Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces (*continued*)

Tasks	Command or Action
c. Configure a Local Loopback on page 200	<code>[edit interfaces <i>interface-name</i> (fastether-options gigether-options))] set loopback show commit</code>
2. Verify That the Fast Ethernet or Gigabit Ethernet Interface Is Up on page 201	<code>show interfaces (fe-fpc/pic/port ge-fpc/pic/port)</code>
3. Configure a Static Address Resolution Protocol Table Entry on page 202	<code>show interfaces ge-fpc/pic/port [edit interfaces <i>interface-name</i> unit logical-unit-number family inet address <i>address</i>] set arp <i>ip-address</i> mac <i>mac-address</i> show commit run show arp no-resolve</code>
4. Clear Fast Ethernet or Gigabit Ethernet Interface Statistics on page 204	<code>clear interfaces statistics fe-fpc/pic/port ge-fpc/pic/port</code>
5. Ping the Fast Ethernet or Gigabit Ethernet Interface on page 204	<code>ping <i>remote-IP-address</i> bypass-routing interface (fe-fpc/pic/port ge-fpc/pic/port count 100 rapid</code>
6. Check for Fast Ethernet or Gigabit Ethernet Interface Error Statistics on page 205	<code>show interfaces (fe-fpc/pic/port ge-fpc/pic/port) extensive</code>
"Diagnose a Suspected Circuit Problem" on page 207	Perform Steps 2 through 8 from "Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface" on page 198.

Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface

Problem When you suspect a hardware problem, take the following steps to help verify if there is a problem.

Solution To diagnose a suspected hardware problem with the Ethernet interface, follow these steps:

- [Create a Loopback on page 199](#)
- [Verify That the Fast Ethernet or Gigabit Ethernet Interface Is Up on page 201](#)
- [Configure a Static Address Resolution Protocol Table Entry on page 202](#)
- [Clear Fast Ethernet or Gigabit Ethernet Interface Statistics on page 204](#)
- [Ping the Fast Ethernet or Gigabit Ethernet Interface on page 204](#)
- [Check for Fast Ethernet or Gigabit Ethernet Interface Error Statistics on page 205](#)

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 transmit and receive ports. 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 for a Fiber-Optic Interface on page 199](#)
2. [Create a Loopback Plug for an RJ-45 Ethernet Interface on page 199](#)
3. [Configure a Local Loopback on page 200](#)

Create a Physical Loopback for a Fiber-Optic Interface

Action To create a physical loopback at the port, connect the transmit port to the receive port using a known good fiber cable.



NOTE: Make sure you use single-mode fiber for a single-mode port and multimode fiber for a multimode port.

Meaning When you create and then 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.

Create a Loopback Plug for an RJ-45 Ethernet Interface

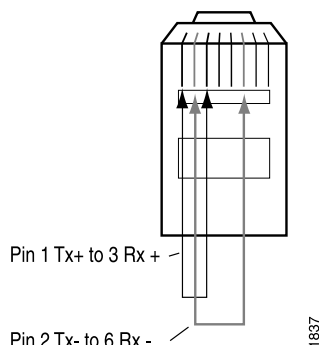
Action To create a loopback plug, cross pin 1 (TX+) and pin 3 (RX+) together, and cross pin 2 (TX-) and pin 6 (RX-) together. You need the following equipment to create the loopback:

- A 6-inch long CAT5 cable
- An RJ-45 connector
- A crimping tool

[Figure 21 on page 200](#) illustrates how to create a loopback plug for an RJ-45 Ethernet interface.

Figure 21: RJ-45 Ethernet Loopback Plug

RJ-45 Ethernet Loopback Plug



Meaning When you create and then test a physical loopback, you are testing the RJ-45 interface 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 without physically connecting the transmit port to the receive port, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces interface-name (fastether-options | gigether-options)
```

2. Configure the local loopback:

```
[edit interfaces interface-name (fastether-options | gigether-options)]
user@host# set loopback
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces fe-1/0/0 fastether-options]
user@host# show
loopback;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces fe-1/0/0 fastether-options]
user@host# commit
commit complete
```

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. On an Ethernet interface, you cannot create a remote loopback, therefore there is no option to

use a **local** or **remote** statement. Simply including the **loopback** statement at the **[edit interfaces interface-name (fastether-options | gigether-options)]** hierarchy level, places the interface into local loopback mode.



NOTE: Remember to delete the loopback statement after completing the test.

Verify That the Fast Ethernet or Gigabit Ethernet Interface Is Up

Purpose Display the status of the Fast Ethernet or Gigabit Ethernet interface to provide the information you need to determine whether the physical link is up or down.

Action To verify that the status of the Fast Ethernet or Gigabit Ethernet interface is up, use the following Junos OS command-line interface (CLI) operational mode command:

```
user@host> show interfaces (fe-fpc/port | ge-fpc/pic/port)
```

Sample Output

```
user@host# show interfaces fe-1/3/0
Physical interface: fe-1/3/0, Enabled, Physical link is Up
  Interface index: 44, SNMP ifIndex: 35
  Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
  Speed: 100mbps, Loopback: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Link flags     : None
  Current address: 00:90:69:8d:2c:db, Hardware address: 00:90:69:8d:2c:db
  Input rate     : 0 bps (0 pps), Output rate: 0 bps (0 pps)
  Active alarms  : None
  Active defects : None
  MAC statistics:
    Input octets: 0, Input packets: 0, Output octets: 0, Output packets: 0
  Filter statistics:
    Filtered packets: 0, Padded packets: 0, Output packet errors: 0
  Autonegotiation information:
    Negotiation status: Incomplete, Link partner status: OK
    Link partner: Full-duplex, Flow control: None
```

Meaning The sample output shows that the link is up and there are no alarms in this loopback configuration. When an internal loopback is configured, the physical loopback should come up without an alarm.

Sample Output When you see that the physical link is down, there may be a problem with the port. The following output is an example of the `show interfaces fe-fpc/pic/port` command when the physical link is down:

```
user@router> show interfaces fe-1/3/0
Physical interface: fe-1/3/0, Enabled, Physical link is Down
  Interface index: 44, SNMP ifIndex: 35
  Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
  Speed: 100mbps, Loopback: Disabled, Flow control: Enabled
  Device flags   : Present Running Down
  Interface flags: Hardware-Down SNMP-Traps
  Link flags     : None
  Current address: 00:90:69:8d:2c:db, Hardware address: 00:90:69:8d:2c:db
```

```

Input rate      : 0 bps (0 pps), Output rate: 0 bps (0 pps)
Active alarms : LINK
Active defects: LINK
MAC statistics:
  Input octets: 0, Input packets: 0, Output octets: 0, Output packets: 0
Filter statistics:
  Filtered packets: 0, Padded packets: 0, Output packet errors: 0
Autonegotiation information:
  Negotiation status: Incomplete, Link partner status: Down
  Reason: Link partner autonegotiation failure
  Link partner: Half-duplex, Flow control: None

```

Meaning The sample output shows that the physical link is down and there are active alarms and defects.

Table 47 on page 202 presents problem situations and actions for a physical link that is down.

Table 47: Problems and Solutions for a Physical Link That Is Down

Problem	Action
Cable mismatch	Verify that the fiber connection is correct.
Damaged and/or dirty cable	Verify that the fiber can successfully loop a known good port of the same type.
Too much or too little optical attenuation	Verify that the attenuation is correct per the PIC optical specifications.
The transmit port is not transmitting within the dBm optical range per the specifications	Verify that the Tx power of the optics is within range of the PIC optical specification.
Mismatch between the cable type and the port	Verify that a single-mode fiber cable is connected to a single-mode interface and that a multimode fiber cable is connected to a multimode interface. (This problem does not always cause the physical link to go down; errors and dropped packets are sometimes the result.)

Configure a Static Address Resolution Protocol Table Entry

Purpose Configure a static Address Resolution Protocol (ARP) entry to allow a packet to be sent out of a looped Ethernet interface.



NOTE: Remove the static ARP entry at the end of the loop test after you have completed the ping test, checked interface statistics, and monitored interface traffic.

Action To configure a static ARP table entry for a Gigabit Ethernet interface, follow these steps. You can follow the same procedure to configure a static ARP entry for a Fast Ethernet interface.

1. Find the Media Access Control (MAC) address for the Gigabit Ethernet interface:

```
user@host> show interfaces ge-fpc/pic/port
```

2. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces interface-name unit logical-unit-number family inet address
address
```

3. Configure the static ARP entry:

```
user@host# set arp ip-address mac mac-address
```



NOTE: The MAC address used should be the same as the physical address of the port being tested because this allows the port to receive the frames when you run the ping test.

4. Verify the configuration:

```
user@host# show
```

5. Commit the configuration:

```
user@host# commit
```

6. Verify that the static ARP entry is installed:

```
user@host# run show arp no-resolve
```

Sample Output

```
user@host> show interfaces ge-7/2/1
Physical interface: ge-7/2/1, Enabled, Physical link is Down
  Interface index: 44, SNMP ifIndex: 35
  Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
  Speed: 100mbps, Loopback: Disabled, Flow control: Enabled
  Device flags   : Present Running Down
  Interface flags: Hardware-Down SNMP-Traps
  Link flags     : None
  Current address: 00:90:69:8d:2c:db, Hardware address: 00:90:69:8d:2c:db
  Input rate     : 0 bps (0 pps), Output rate: 0 bps (0 pps)
[edit interfaces ge-7/2/1 unit 0 family inet address 10.108.120.1/30]

user@host# set arp 10.108.120.2 mac 00:90:69:8d:2c:db
[edit interfaces ge-7/2/1 unit 0 family inet address 10.108.120.1/30]

user@host# show
arp 10.108.120.2 mac 00:90:69:8d:2c:db;
[edit interfaces ge-7/2/1 unit 0 family inet address 10.108.120.1/30]

user@host# commit
commit complete
[edit interfaces ge-7/2/1 unit 0 family inet address 10.108.120.1/30]

user@host# run show arp no-resolve
MAC Address      Address      Interface    Flags
00:90:69:8d:2c:db 10.108.120.2 ge-7/2/1.0   permanent
00:e0:34:bb:8c:40 209.211.135.1 fxp0.0       none
00:a0:a5:28:0c:70 209.211.135.8 fxp0.0       none
00:a0:a5:12:12:c7 209.211.135.10 fxp0.0       none
```

```

00:90:ab:3c:68:a0 209.211.135.31 fxp0.0      none
08:00:20:a1:53:15 209.211.135.65 fxp0.0      none
00:a0:cc:66:3e:85 209.211.135.98 fxp0.0      none
Total entries: 7

```

Meaning The sample output is for Step 1 through Step 6 and shows that a static ARP entry was configured on Gigabit Ethernet interface **ge-7/2/1**. The MAC address used is the same as the physical address of the port being tested because this allows the port to receive the frames when you run the ping test. The port is working as expected if you see that the time to live (TTL) expired; if you do not receive a response to your ping test, it indicates a hardware problem.

Clear Fast Ethernet or Gigabit Ethernet Interface Statistics

Purpose You must reset the Fast Ethernet and Gigabit Ethernet 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 diagnostics.

Action To clear all statistics for the interface, use the following Junos OS CLI operational mode command:

```
user@host> clear interfaces statistics (fe-fpc/pic/port | ge-fpc/pic/port)
```

Sample Output user@host> clear interfaces statistics ge-7/2/0
user@host>

Meaning This command clears the interface statistics counters for the Gigabit Ethernet interface only.

Ping the Fast Ethernet or Gigabit Ethernet Interface

Purpose Use the ping command to verify the loopback connection.

Action To send ping packets from the Ethernet interface, use the following Junos OS CLI operational mode command:

```
user@host> ping remote-IP-address bypass-routing interface (fe-fpc/pic/port |
ge-fpc/pic/port) count 100 rapid
```

Sample Output user@router> ping 10.108.120.2 bypass-routing interface ge-7/2/1 count 100 rapid
PING 10.108.120.2 (10.108.120.2): 56 data bytes
36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS Len ID Flg off TTL Pro cks Src Dst
4 5 00 0054 e871 0 0000 01 01 cc5c 10.108.120.1 10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS Len ID Flg off TTL Pro cks Src Dst
4 5 00 0054 e874 0 0000 01 01 cc59 10.108.120.1 10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS Len ID Flg off TTL Pro cks Src Dst
4 5 00 0054 e878 0 0000 01 01 cc55 10.108.120.1 10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS Len ID Flg off TTL Pro cks Src Dst
4 5 00 0054 e87c 0 0000 01 01 cc51 10.108.120.1 10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded

```

Vr HL TOS Len  ID Flg  off TTL Pro  cks      Src      Dst
 4  5  00 0054 e880  0 0000 01 01 cc4d 10.108.120.1 10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded
Vr HL TOS Len  ID Flg  off TTL Pro  cks      Src      Dst
 4  5  00 0054 e884  0 0000 01 01 cc49 10.108.120.1 10.108.120.2
.36 bytes from 10.108.120.1: Time to live exceeded

```

Meaning The sample output shows that the time to live (TTL) expired, indicating that the link is receiving the frames from the ping test. The MAC address used is the same as the physical address of the port being tested because this allows the port to accept the frames from the ping test. As the packet is looped over the link, you expect to receive a TTL exceeded message for each ping sent. These messages are generated because the ping packets are repeatedly looped between the router and the physical loopback. When the packet is sent to the other end of the link, which does not exist, the loopback returns the packet back to the same interface, where it is again subjected to the Packet Forwarding Engine fabric for routing. After the route lookup, the TTL is decremented, and the packet is again sent out of the looped interface. This process repeats until the packet is either lost, or the TTL expires with subsequent TTL expired message displayed. Should any errors occur, the packet is discarded and a time-out error is displayed, rather than the expected TTL expired message. Note that the default TTL for ICMP echo packets in Junos OS is 64. This means a given test packet must be successfully sent and received 63 times before a TTL expired message can be generated. You can alter the TTL value to adjust the tolerance for loss, for example, a value of 255 is the most demanding test because now the packet must be sent and received error free 254 times.

Check for Fast Ethernet or Gigabit Ethernet Interface Error Statistics

Purpose Persistent interface error statistics indicate that you need to open a case with the Juniper Networks Technical Assistance Center (JTAC).

Action To check the local interface for error statistics, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces (fe-fpc/pic/port | ge-fpc/pic/port) extensive
```

Sample Output

```

user@router> show interfaces ge-7/2/1 extensive
Physical interface: ge-7/2/1, Enabled, Physical link is Up
Interface index: 25, SNMP ifIndex: 32, Generation: 41
Description: Test
Link-level type: Ethernet, MTU: 4470, Speed: 1000mbps, Loopback: Disabled,
Source filtering: Disabled, Flow control: Disabled
Device flags   : Present Running
Interface flags: SNMP-Traps
Link flags     : None
Hold-times    : Up 0 ms, Down 0 ms
Current address: 00:90:69:4c:17:b1, Hardware address: 00:90:69:4c:17:b1
Statistics last cleared: 2002-01-07 17:53:19 UTC (2w2d 03:20 ago)
Traffic statistics:
Input bytes   :          3799515503823          0 bps
Output bytes  :          7325566425          0 bps
Input packets:          4628009535          0 pps
Output packets:          30678225          0 pps
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Runt: 0, Policed discards: 0, L3
incompletes: 0,

```

```

L2 channel errors: 0, L2 mismatch timeouts: 0, FIFO errors: 0
Output errors:
  Carrier transitions: 14, Errors: 0, Drops: 0, Collisions: 0, Aged packets:
0,
  FIFO errors: 0, HS link CRC errors: 0
Active alarms : None
Active defects : None
MAC statistics:
  Receive          Transmit
Total octets      3883579444813    7880356346
Total packets    4628009534      30678237
Unicast packets  4627879788      29893563
Broadcast packets      30      464
Multicast packets    129716     784210
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    4628009244
  Input packet rejects  0
  Input DA rejects      0
  Input SA rejects      0
  Output packet count           30678237
  Output packet pad count      856248
  Output packet error count    0
  CAM destination filters: 9, CAM source filters: 0
Autonegotiation information:
  Negotiation status: Complete, Link partner status: Ok, Link partner:
Full-duplex,
  Flow control: None
PFE configuration:
  Destination slot: 7
  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 ge-7/2/1.0 (Index 23) (SNMP ifIndex 48) (Generation 38)
Description: To Cosine Left 23/1
Flags: SNMP-Traps Encapsulation: ENET2
Protocol inet, MTU: 4456, Flags: None, Generation: 85 Route table: 0
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.108.120.0/30, Local: 10.108.120.1, Broadcast: 10.108.120.3,
    Generation: 81
  Protocol iso, MTU: 4453, Flags: None, Generation: 86 Route table: 0

```

Meaning Check for any error statistics. There should not be any input or output errors. If there are any persistent input or output errors, open a case with the Juniper Networks Technical Assistance Center (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 create 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 8 in [“Diagnose a Suspected Hardware Problem with a Fast Ethernet or Gigabit Ethernet Interface” on page 198](#). 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.

CHAPTER 20

Locate the Fast Ethernet and Gigabit Ethernet LINK Alarm and Counters

This chapter describes the LINK alarm and major counters associated with Fast Ethernet and Gigabit Ethernet interfaces. The LINK alarm is the only Fast Ethernet or Gigabit Ethernet alarm encountered when isolating line problems on a Juniper Networks router.

- [Checklist for Locating Fast Ethernet and Gigabit Ethernet Alarms and Counters on page 209](#)
- [Display the Fast Ethernet or Gigabit Ethernet Interface LINK Alarm on page 209](#)
- [Fast Ethernet and Gigabit Ethernet Counters on page 211](#)

Checklist for Locating Fast Ethernet and Gigabit Ethernet Alarms and Counters

Purpose	To locate LINK alarm and major counters associated with Fast Ethernet and Gigabit Ethernet interfaces.
Action	Table 48 on page 209 provides links and commands for locating LINK alarm and major counters for Fast Ethernet and Gigabit Ethernet interfaces.

Table 48: Checklist for Locating Fast Ethernet and Gigabit Ethernet Alarms and Counters

Tasks	Command or Action
“Display the Fast Ethernet or Gigabit Ethernet Interface LINK Alarm” on page 209	<code>show interfaces (fe-fpc/pic/port ge-fpc/pic/port) extensive</code>
“Fast Ethernet and Gigabit Ethernet Counters” on page 211	

Display the Fast Ethernet or Gigabit Ethernet Interface LINK Alarm

Problem	To display the Fast Ethernet or Gigabit Ethernet LINK alarm, use the following Junos OS command-line interface (CLI) operational mode command:
Solution	<code>user@host> show interfaces (fe-fpc/pic/port ge-fpc/pic/port) extensive</code>

Sample Output The following sample output is for a Fast Ethernet interface:

```

user@host> show interfaces fe-1/3/3 extensive
Physical interface: fe-1/3/3, Enabled, Physical link is Down
  Interface index: 47, SNMP ifIndex: 38
  Description: Test
  Link-level type: Ethernet, MTU: 1514, Source filtering: Disabled
  Speed: 100mbps, Loopback: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Link flags     : None
  Current address: 00:90:69:8d:2c:de, Hardware address: 00:90:69:8d:2c:de
  Statistics last cleared: 2002-01-11 23:03:09 UTC (1w2d 23:54 ago)
  Traffic statistics:
    Input bytes   :          373012658          0 bps
    Output bytes  :          153026154        1392 bps
    Input packets :          1362858          0 pps
    Output packets:          1642918          3 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 503660
    L3 incompletes: 1, L2 channel errors: 0, L2 mismatch timeouts: 0
    FIFO errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Collisions: 0, Drops: 0, Aged packets: 0
    HS link CRC errors: 0, FIFO errors: 0
  Active alarms : LINK
  Active defects : LINK
  MAC statistics:
    Receive          Transmit
    Total octets     439703575    177452093
    Total packets    1866532      1642916
    Unicast packets   972137      1602563
    Broadcast packets    30         2980
    Multicast packets  894365      37373
    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      1866532
    Input packet rejects     0
    Input DA rejects        503674
    Input SA rejects        0
    Output packet count           1642916
    Output packet pad count       0
    Output packet error count     0
    CAM destination filters: 5, CAM source filters: 0
  Autonegotiation information:
    Negotiation status: Complete, Link partner status: OK
    Link partner: Full-duplex, Flow control: None
  PFE configuration:
    Destination slot: 1, Stream number: 15
    CoS transmit queue bandwidth:
      Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
    CoS weighted round-robin:
      Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
  Logical interface fe-1/3/3.0 (Index 8) (SNMP ifIndex 69)

```


Description: Test
Flags: SNMP-Traps, Encapsulation: ENET2
Protocol inet, MTU: 1500, Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 10.115.107.192/29, Local: 10.115.107.193
Broadcast: 10.115.107.199

Meaning The sample output shows where the alarm and other errors might be occurring and any counters that are incrementing. The only alarm associated with Fast Ethernet or Gigabit Ethernet interfaces is the LINK alarm. A LINK alarm indicates a physical problem. To isolate where the physical problem might be occurring, conduct loopback testing. See [“Checklist for Using Loopback Testing for Fast Ethernet and Gigabit Ethernet Interfaces”](#) on page 197 for information on conducting a loopback test.



NOTE: Since link status is polled once every second, some items that require fast link down detection, such as Multiprotocol Label Switching (MPLS) fast reroute, take longer to execute.

Fast Ethernet and Gigabit Ethernet Counters

Problem Table 49 on page 211 shows the major counters that appear in the output for the **show interfaces fe-fpc/pic/port extensive** and the **show interfaces ge-fpc/pic/port extensive** commands. These counters generally increment when there is a problem with a Fast Ethernet or Gigabit Ethernet interface. In the **Counters** column, the counters are listed in the order in which they are displayed in the output.

Table 49: Major Fast Ethernet and Gigabit Ethernet Counters

Counter	Description	Reason for Increment
Input Errors:		
Errors	The sum of the incoming frame aborts and frame check sequence (FCS) errors.	
Policed discards	The frames discarded by the incoming packet match code.	The frames were discarded because they were not recognized or of interest. Usually, this field reports protocols that the Junos OS does not handle.
Drops	The number of packets dropped by the output queue of the I/O Manager application-specific integrated circuit (ASIC).	If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's random early detection (RED) mechanism.
L3 incompletes	The number of packets discarded due to the packets failing Layer 3 header checks.	This counter increments when the incoming packet fails Layer 3 (usually IPv4) checks of the header. For example, a frame with less than 20 bytes of available IP header would be discarded and this counter would increment.

Table 49: Major Fast Ethernet and Gigabit Ethernet Counters (*continued*)

Counter	Description	Reason for Increment
L2 channel errors	The errors that occur when the software could not find a valid logical interface (such as fe-1/2/3.0) for an incoming frame.	This error increments when, for example, a lookup for a virtual LAN (VLAN) fails.
L2 mismatch timeouts	The count of malformed or short packets.	The malformed or short packets cause the incoming packet handler to discard the frame and be unreadable.
FIFO errors	The number of first in, first out (FIFO) errors in the receive direction as reported by the ASIC on the Physical Interface Card (PIC).	The value in this field should always be 0. If this value is not zero, cabling could be badly organized or the PIC could be broken.
Output Errors		
Errors	The sum of outgoing frame aborts and FCS errors.	
Collisions	The number of Ethernet collisions.	The Fast Ethernet PIC supports only full-duplex operation, so this number should always remain 0. If it is incrementing, there is a software bug.
Drops	The 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	The number of packets that remained in shared packet SDRAM for so long that the system automatically purged them.	The value in this field should never increment. If it increments, it is probably a software bug or broken hardware.
HS link FCS errors, FIFO errors	The number of errors on the high-speed links between the ASICs responsible for handling the router interfaces.	The value in this field should always be 0. If it increments, either the FPC or the PIC is broken.
Miscellaneous Counters		
Input DA rejects	The number of packets that the filter rejected because the destination Media Access Control (MAC) address of the packet is not on the accept list.	It is normal for this value to increment. When it increments very quickly and no traffic is entering the router from the far-end system, either there is a bad Address Resolution Protocol (ARP) entry on the far-end system, or multicast routing is not on and the far-end system is sending many multicast packets to the local router (which the router is rejecting).
Output packet pad count	The number of packets that the filter padded to the minimum Ethernet size (60 bytes) before giving the packet to the MAC hardware.	Usually, padding is done only on small ARP packets, but some very small Internet Protocol (IP) packets can also require padding. If this value increments rapidly, either the system is trying to find an ARP entry for a far-end system that does not exist, or it is misconfigured.

Table 49: Major Fast Ethernet and Gigabit Ethernet Counters (*continued*)

Counter	Description	Reason for Increment
Output packet error count	Number of packets with an indicated error that the filter was given to transmit.	These packets are usually aged packets or are the result of a bandwidth problem on the FPC hardware. On a normal system, the value of this field should not increment.
CAM destination filters, CAM source filters	The number of entries in the content-addressable memory (CAM) dedicated to destination and source MAC address filters.	There can be up to 64 source entries. If source filtering is disabled, which is the default, the value for these fields should be 0.

PART 7

Investigate Channelized Interfaces

- [Monitor Channelized DS3 Interfaces on page 217](#)
- [Use Loopback Testing For Channelized DS3 Interfaces on page 231](#)
- [Locate Channelized DS3 Alarms and Errors on page 243](#)
- [Monitor Multichannel DS3 Interfaces on page 249](#)
- [Use Loopback Testing for Multichannel DS3 Interfaces on page 259](#)
- [Locate Multichannel DS3 Alarms and Errors on page 275](#)
- [Monitor Channelized OC12 Interfaces on page 283](#)
- [Use Loopback Testing for Channelized OC12 Interfaces on page 303](#)
- [Locate Channelized OC12 Alarms and Errors on page 317](#)

CHAPTER 21

Monitor Channelized DS3 Interfaces

This chapter describes how to monitor Channelized DS3 interfaces and begin the process of isolating Channelized DS3 interface problems when they occur.

- [Checklist for Monitoring Channelized DS3 Interfaces on page 217](#)
- [Monitor Channelized DS3 Interfaces on page 217](#)

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 50 on page 217](#) provides the links and commands for monitoring Channelized DS3 interfaces.

Table 50: Checklist for Monitoring Channelized DS3 Interfaces

Tasks	Command or Action
“Monitor Channelized DS3 Interfaces” on page 217	
1. Display the Status of Channelized DS3 Interfaces on page 218	show interfaces terse t1*
2. Display the Status of a Specific Channelized DS3 Interface on page 219	show interfaces t1-<i>fpc/pic/port:channel</i>
3. Display Extensive Status Information for a Specific Channelized DS3 Interface on page 222	show interfaces t1-<i>fpc/pic/port:channel</i> extensive
4. Monitor Statistics for a Channelized DS3 Interface on page 227	monitor interfaces t1-<i>fpc/pic/port:channel</i>

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 218](#)
2. [Display the Status of a Specific Channelized DS3 Interface on page 219](#)
3. [Display Extensive Status Information for a Specific Channelized DS3 Interface on page 222](#)
4. [Monitor Statistics for a Channelized DS3 Interface on page 227](#)

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
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
  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
```

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, mp1s:
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.

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

    2 assured-forw              0              0              0

    3 network-cont          63083          63083              0

  DS1 alarms :None
  DS1 defects :None
  T1 media:
    SEF          5      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, 0.151, 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
  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, 0.151, 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
  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, 0.151, 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 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:

- DSI alarms
- DSI defects
- T1 media

Both sample output 1 and 2 show no DSI 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” on page 149](#).

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]
  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 tl-0/3/3:2
host      Seconds: 9      Time: 10:36:11
Delay: 3/3/3
Interface: tl-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 runs:                  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 tl-1/2/0:19
host      Seconds: 9      Time: 19:05:23
Delay: 0/0/68
Interface: tl-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]
  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.

CHAPTER 22

Use Loopback Testing For Channelized DS3 Interfaces

This chapter describes using loopback testing to isolate Channelized DS3 interface problems.

- [Checklist for Using Loopback Testing for Channelized DS3 Interfaces on page 231](#)
- [Diagnose a Suspected Hardware Problem with a Channelized DS3 Interface on page 232](#)
- [Create a Loopback on page 233](#)
- [Verify That the Interface Is Up on page 234](#)
- [Clear Interface Statistics on page 235](#)
- [Force the Link Layer to Stay Up on page 235](#)
- [Verify the Status of the Logical Interface on page 237](#)
- [Ping the Channelized Interface on page 238](#)
- [Check for Interface Error Statistics on page 238](#)
- [Diagnose a Suspected Circuit Problem on page 240](#)

Checklist for Using Loopback Testing for Channelized DS3 Interfaces

- Purpose** To use loopback testing to isolate Channelized DS3 interface problems.
- Action** [Table 51 on page 231](#) provides the links and commands for using loopback testing for Channelized DS3 interfaces.

Table 51: 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 232	
1. Create a Loopback on page 233	
a. Create a Physical Loopback on page 233	Connect the TX port to the RX port.

Table 51: Checklist for Using Loopback Testing for Channelized DS3 Interfaces (*continued*)

Tasks	Command or Action
b. Configure a Local Loopback on page 233	<code>[edit interfaces <i>interface name</i> (t3-options t1-options)]</code> <code>set loopback local</code> <code>show</code> <code>commit</code>
2. Verify That the Interface Is Up on page 234	<code>show interfaces t1-<i>fpc/pic/port:channel</i></code> <code>show interfaces t3-<i>fpc/pic/port:channel</i></code>
3. Clear Interface Statistics on page 235	<code>clear interfaces statistics t1-<i>fpc/pic/port:channel</i></code>
4. Force the Link Layer to Stay Up on page 235	
a. Configure Encapsulation to Cisco-HDLC on page 235	<code>[edit interfaces <i>interface-name</i>]</code> <code>set encapsulation cisco-hdlc</code> <code>show</code> <code>commit</code>
b. Configure No-Keepalives on page 236	<code>[edit interfaces <i>interface-name</i>]</code> <code>set no-keepalives</code> <code>show</code> <code>commit</code>
5. Verify the Status of the Logical Interface on page 237	<code>show interfaces t1-<i>fpc/pic/port:channel</i></code>
6. Ping the Channelized Interface on page 238	<code>ping interface t1-<i>fpc/pic/port:channel</i> <i>local-IP-address</i></code> <code>bypass-routing count 1000 rapid</code>
7. Check for Interface Error Statistics on page 238	<code>show interfaces t1-<i>fpc/pic/port:channel</i> extensive</code>
“Diagnose a Suspected Circuit Problem” on page 240	
8. “Create a Loop from the Router to the Network” on page 241	<code>[edit interfaces t1-<i>fpc/pic/port:channel</i> t1-options]</code> <code>set loopback remote</code> <code>show</code> <code>commit</code>
9. Create a Loop to the Router from Various Points in the Network on page 241	Perform Steps 2 through 8 from “Diagnose a Suspected Hardware Problem with a Channelized DS3 Interface” on page 232.

Diagnose a Suspected Hardware Problem with a Channelized DS3 Interface

Problem To diagnose a suspected hardware problem with a Channelized DS3 interface, follow these steps:

Solution

- [Create a Loopback on page 233](#)
- [Verify That the Interface Is Up on page 234](#)

- [Clear Interface Statistics on page 235](#)
- [Force the Link Layer to Stay Up on page 235](#)
- [Verify the Status of the Logical Interface on page 237](#)
- [Ping the Channelized Interface on page 238](#)
- [Check for Interface Error Statistics on page 238](#)

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 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 233](#)
2. [Configure a Local Loopback on page 233](#)

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
```

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 243](#) for more information on Channelized DS3 alarms and errors.

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.

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 235](#)
2. [Configure No-Keepalives on page 236](#)

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
```

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.

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
  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
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
--- 10.10.1.2 ping statistics ---
1000 packets transmitted, 1000 packets received, 0% packet loss
round-trip min/avg/max/stddev = 2.830/3.872/9.965/0.633 ms
```

Meaning	This command sends 1000 ping packets out of the channelized interface under the Channelized DS3 port to the local IP address. The ping should complete successfully with no packet loss. If there is any persistent packet loss, open a case with the Juniper Networks Technical Assistance Center (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).
----------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Check for Interface Error Statistics

Purpose Persistent interface error statistics indicate that you need to open a case with JTAC.

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
    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, 0.151, 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.

To diagnose a suspected circuit problem, follow these steps:

1. [Create a Loop from the Router to the Network on page 241](#)
2. [Create a Loop to the Router from Various Points in the Network on page 241](#)

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 Interface” on page 232](#). 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.

CHAPTER 23

Locate Channelized DS3 Alarms and Errors

This chapter describes the most common Channelized DS3 alarms and errors when investigating line problems on a Juniper Networks router.

- [Checklist for Channelized DS3 Alarms and Errors on page 243](#)
- [Display Alarms and Errors for Channelized DS3 Interfaces on page 243](#)

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 52 on page 243](#) provides links and commands for Channelized DS3 alarms and errors.

Table 52: Checklist for Channelized DS3 Alarms and Errors

Tasks	Command or Action
“Display Alarms and Errors for Channelized DS3 Interfaces” on page 243	<code>show interfaces t1-fpc/pic/port:channel extensive</code>

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
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
TI media:
  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, 0.151, 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

```

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, mpIs:
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:
SEF          Seconds      Count  State
BEE          33           31    OK
             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, 0.151, 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 53 on page 247 shows T1 media-specific alarms or defects that can render the interface unable to pass packets.

Table 53: 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” on page 41 for more details on T1 alarms and statistics.

CHAPTER 24

Monitor Multichannel DS3 Interfaces

This chapter describes how to monitor Multichannel DS3 interfaces and begin the process of isolating Multichannel DS3 interface problems when they occur.

- [Checklist for Monitoring Multichannel DS3 Interfaces on page 249](#)
- [Monitor Multichannel DS3 Interfaces on page 249](#)

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 54 on page 249](#) provides the links and commands for monitoring Multichannel DS3 interfaces.

Table 54: Checklist for Monitoring Multichannel DS3 Interfaces

Tasks	Command or Action
“Monitor Multichannel DS3 Interfaces” on page 249	
1. Display the Status of Channelized Interfaces on page 250	<code>show interfaces terse ds*</code> <code>show interfaces terse t1*</code>
2. Display the Status of a Specific Channelized Interface on page 250	<code>show interfaces ds-fpc/pic/port:channel:channel</code> <code>show interfaces t1-fpc/pic/port:channel</code>
3. Display Extensive Status Information for a Specific T3 Interface on page 252	<code>show interfaces ds-fpc/pic/port:channel:channel extensive</code> <code>show interfaces t1-fpc/pic/port:channel extensive</code>
4. Monitor Statistics for a Channelized Interface on page 255	<code>monitor interfaces ds-fpc/pic/port:channel:channel</code> <code>monitor interfaces t1-fpc/pic/port:channel</code>

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 250](#)
2. [Display the Status of a Specific Channelized Interface on page 250](#)
3. [Display Extensive Status Information for a Specific T3 Interface on page 252](#)
4. [Monitor Statistics for a Channelized Interface on page 255](#)

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.

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 tl-2/1/0:19
Physical interface: tl-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 tl-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: 192.168.118.96/30, Local: 192.168.118.97
```

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
    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, 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: 192.168.140.196/30, 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
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, 0.151, 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 275](#) 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:
  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 runs:                  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:
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 runs:                  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.



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 55 on page 257 lists additional problem situations and actions to help you further understand an interface problem.

Table 55: 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.

CHAPTER 25

Use Loopback Testing for Multichannel DS3 Interfaces

This chapter describes using loopback testing to isolate Multichannel DS3 interface problems.

- [Checklist for Using Loopback Testing for Multichannel DS3 Interfaces on page 259](#)
- [Diagnose a Suspected Hardware Problem with a Multichannel DS3 Interface on page 261](#)
- [Create a Loopback on page 261](#)
- [Verify That the Interface Is Up on page 262](#)
- [Clear Interface Statistics on page 263](#)
- [Force the Link Layer to Stay Up on page 264](#)
- [Verify the Status of the Logical Interface on page 265](#)
- [Ping the Channelized Interface on page 266](#)
- [Check for Interface Error Statistics on page 267](#)
- [Diagnose a Suspected Circuit Problem on page 271](#)
- [Create a Loop from the Router to the Network on page 271](#)
- [Create a Loop to the Router from Various Points in the Network on page 272](#)

Checklist for Using Loopback Testing for Multichannel DS3 Interfaces

Purpose To use loopback testing to isolate Multichannel DS3 interface problems.

Action [Table 56 on page 259](#) provides links and commands for using loopback testing for Multichannel DS3 interfaces.

Table 56: 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 261	
1. Create a Loopback on page 261	
a. Create a Physical Loopback on page 261	Connect the TX port to the RX port.

Table 56: Checklist for Using Loopback Testing for Multichannel DS3 Interfaces (*continued*)

Tasks	Command or Action
b. Configure a Local Loopback on page 261	[edit interfaces <i>interface name</i> (t3-options t1-options)] set loopback local show commit
2. Verify That the Interface Is Up on page 262	show interfaces (ds- <i>fpc/pic/port:channel:channel</i> t1- <i>fpc/pic/port:channel</i>)
3. Clear Interface Statistics on page 263	clear interfaces statistics (t1- <i>fpc/pic/port:channel</i> ds- <i>fpc/pic/port:channel:channel</i>)
4. Force the Link Layer to Stay Up on page 264	
a. Configure Encapsulation to Cisco-HDLC on page 264	[edit interfaces <i>interface-name</i>] set encapsulation cisco-hdlc show commit
b. Configure No-Keepalives on page 265	[edit interfaces <i>interface-name</i>] set no-keepalives show commit
5. Verify the Status of the Logical Interface on page 265	show interfaces (ds- <i>fpc/pic/port:channel:channel</i> t1- <i>fpc/pic/port:channel</i>)
6. Ping the Channelized Interface on page 266	ping interface (ds- <i>fpc/pic/port:channel:channel</i> t1- <i>fpc/pic/port:channel</i>) <i>local-IP-address</i> bypass-routing count 1000 rapid
7. Check for Interface Error Statistics on page 267	show interfaces (ds- <i>fpc/pic/port:channel:channel</i> t1- <i>fpc/pic/port:channel</i>) extensive
“Diagnose a Suspected Circuit Problem” on page 271	
1. Create a Loop from the Router to the Network on page 271	
a. Loop the Entire T3 Interface towards the Network on page 271	[edit interfaces <i>interface-name</i> t3-options] set loopback remote show commit
b. Loop a Particular T1 Channel towards the Network on page 272	[edit interfaces <i>interface-name</i> t1-options] set loopback remote show commit
2. Create a Loop to the Router from Various Points in the Network on page 272	Perform Steps 2 through 8 from “ Diagnose a Suspected Hardware Problem with a Multichannel DS3 Interface ” on page 261.

Diagnose a Suspected Hardware Problem with a Multichannel DS3 Interface

Problem To diagnose a suspected hardware problem with a Multichannel DS3 interface, follow these steps:

- Solution**
- [Create a Loopback on page 261](#)
 - [Verify That the Interface Is Up on page 262](#)
 - [Clear Interface Statistics on page 263](#)
 - [Force the Link Layer to Stay Up on page 264](#)
 - [Verify the Status of the Logical Interface on page 265](#)
 - [Ping the Channelized Interface on page 266](#)
 - [Check for Interface Error Statistics on page 267](#)

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 261](#)
2. [Configure a Local Loopback on page 261](#)

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 t3-options]
```



NOTE: In order to configure T3 options on the Multichannel DS3, you configure the first logical interfaces: `ds-2/1/0:0 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:

```
[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 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
    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 DS1 or 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.

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 264](#)
2. [Configure No-Keepalives on page 265](#)

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.

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:
  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 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
  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
```

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
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
--- 192.168.126.29 ping statistics ---
1000 packets transmitted, 1000 packets received, 0% packet loss
round-trip min/avg/max/stddev = 6.068/7.475/74.080/3.696 ms
```

Meaning This command sends 1000 ping packets out of the channelized interface under the Multichannel DS3 port to the local IP address. The ping should complete successfully with no packet loss. If there is any persistent packet loss, open a case with the Juniper Networks Technical Assistance Center (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).

Check for Interface Error Statistics

Purpose Persistent interface error statistics indicate that you need to open a case with JTAC.

Action To check the local interface for error statistics, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces (ds-fpc/pic/port:channel:channel | 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
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, 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: 192.168.140.196/30, 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 tl-2/1/0:19 extensive
Physical interface: tl-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
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, 0.151, 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).

Diagnose a Suspected Circuit Problem

Problem 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 271](#)
- [Create a Loop to the Router from Various Points in the Network on page 272](#)

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 towards the Network on page 271](#)
2. [Loop a Particular T1 Channel towards the Network on page 272](#)

Loop the Entire T3 Interface towards 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
```

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 towards 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**)

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 261](#). 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.

CHAPTER 26

Locate Multichannel DS3 Alarms and Errors

This chapter describes the most common Multichannel DS3 alarms and errors encountered when investigating line problems on a Juniper Networks router.

- [Checklist for Locating Multichannel DS3 Alarms and Errors on page 275](#)
- [Display Alarms and Errors for Channelized DS3 to DS1 Interfaces on page 275](#)
- [Display Alarms and Errors for Channelized DS3 to DS0 Interfaces on page 278](#)

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 57 on page 275](#) provides links and commands for Multichannel DS3 alarms and errors.

Table 57: Checklist for Multichannel DS3 Alarms and Errors

Tasks	Command or Action
“Display Alarms and Errors for Channelized DS3 to DS1 Interfaces” on page 275	<code>show interfaces t1-fpc/pic/port:channel extensive</code>
“Display Alarms and Errors for Channelized DS3 to DS0 Interfaces” on page 278	<code>show interfaces ds-fpc/pic/port:channel:channel extensive</code>

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:
- 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
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, 0.151, 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 58 on page 277](#) shows T1 media-specific alarms or defects that can render the interface unable to pass packets.

**Table 58: 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                    |

Table 58: T1 Media Alarms and Error Definitions (*continued*)

| T1 Media Alarm or Error | Definitions                    |
|-------------------------|--------------------------------|
| 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” on page 41 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
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
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.

Table 58 on page 277 shows T3 media-specific alarms or errors that can render the interface unable to pass packets.

**Table 59: T3 Interface Error Counter Definitions**

| T3 Alarm or Error | Definition              |
|-------------------|-------------------------|
| AIS               | Alarm indication signal |
| EXZ               | Excessive zeros         |

Table 59: 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                       |

See [“Checklist of Common T3 Alarms and Errors”](#) on [page 67](#) for more details on T3 alarms and statistics.





## CHAPTER 27

# Monitor Channelized OC12 Interfaces

This chapter describes how to monitor Channelized OC12 interfaces and begin the process of isolating Channelized OC12 interface problems when they occur.

- [Checklist for Monitoring Channelized OC12 Interfaces on page 283](#)
- [Monitor Channelized OC12 Interfaces on page 284](#)
- [Monitor Channelized OC12 IQ Interfaces on page 289](#)

### 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 60 on page 283](#) provides links and commands for monitoring Channelized OC12 interfaces.

**Table 60: Checklist for Monitoring Channelized OC12 Interfaces**

| Tasks                                                                                                         | Command or Action                                                                                                        |
|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>“Monitor Channelized OC12 Interfaces” on page 284</b>                                                      |                                                                                                                          |
| 1. <a href="#">Display the Status of Channelized OC12 Interfaces on page 284</a>                              | <code>show interfaces terse t3-interface-name*</code>                                                                    |
| 2. <a href="#">Display the Status of a Specific Channelized OC12 Interface on page 285</a>                    | <code>show interfaces terse t3-fpc/pic/port:channel</code>                                                               |
| 3. <a href="#">Display Extensive Status Information for a Specific Channelized OC12 Interface on page 285</a> | <code>show interfaces t3-fpc/pic/port:channel extensive</code>                                                           |
| 4. <a href="#">Monitor Statistics for a Channelized OC12 Interface on page 288</a>                            | <code>monitor interfaces t3-fpc/pic/port:channel</code>                                                                  |
| <b>“Monitor Channelized OC12 IQ Interfaces” on page 289</b>                                                   |                                                                                                                          |
| 1. <a href="#">Display the Status of a Channelized OC12 IQ Interface on page 289</a>                          | <code>show interfaces terse coc*</code><br><code>show interfaces controller</code><br><code>show interfaces terse</code> |

**Table 60: Checklist for Monitoring Channelized OC12 Interfaces**  
(continued)

| Tasks                                                                                                      | Command or Action                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2. <a href="#">Display the Status of the Controller Channelized OC12 IQ Interface on page 293</a>          | <code>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</code> |
| 3. <a href="#">Display the Status of a Specific Channel of a Channelized OC12 IQ Interface on page 295</a> | <code>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</code>                                                                                         |
| 4. <a href="#">Display Extensive Status Information for a Channelized OC12 IQ Interface on page 297</a>    | <code>show interfaces interface-type-interface-name extensive</code>                                                                                                                                                                                                                     |
| 5. <a href="#">Monitor Statistics for a Channelized OC12 IQ Interface on page 300</a>                      | <code>monitor interfaces interface-type-fpc/pic/port:channel</code>                                                                                                                                                                                                                      |

## 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 284](#)
2. [Display the Status of a Specific Channelized OC12 Interface on page 285](#)
3. [Display Extensive Status Information for a Specific Channelized OC12 Interface on page 285](#)
4. [Monitor Statistics for a Channelized OC12 Interface on page 288](#)

## 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
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 283](#).

### 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 283](#).

### 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 interface t3-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
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
 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 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 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:
 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]
 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 289](#)
2. [Display the Status of the Controller Channelized OC12 IQ Interface on page 293](#)
3. [Display the Status of a Specific Channel of a Channelized OC12 IQ Interface on page 295](#)
4. [Display Extensive Status Information for a Channelized OC12 IQ Interface on page 297](#)
5. [Monitor Statistics for a Channelized OC12 IQ Interface on page 300](#)

### 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
coc12-0/0/0
 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
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.

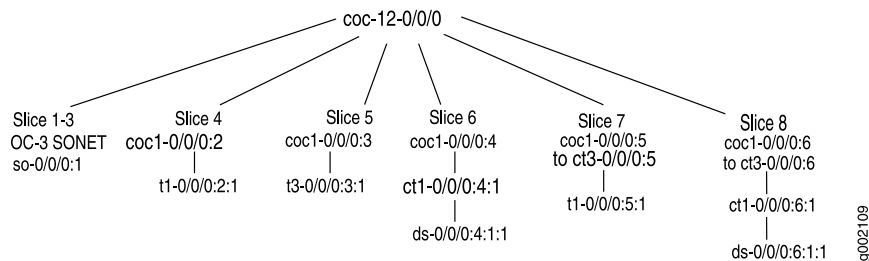
Sample output 2 shows the channels for the channelized interfaces that are configured and the hierarchy, but not the interface address information. At the top, the hierarchy includes the controller interface **coc12-0/0/0**.

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 22 on page 291](#).

**Figure 22: 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 {
 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-Os.";
 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 22 on page 291](#). 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

```

**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**

```

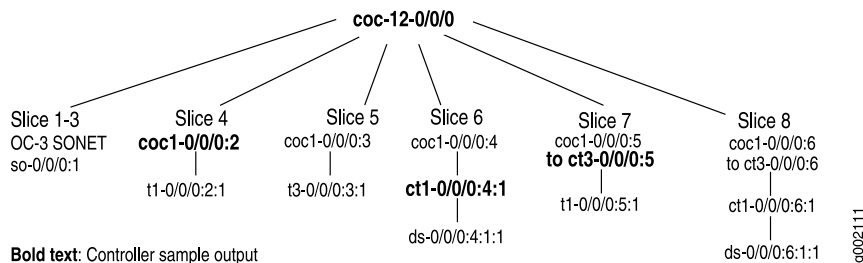
user@host> show interfaces ct1-0/0/0:4:1
Physical interface: ct1-0/0/0:4:1, Enabled, Physical link is Up
Interface index: 230, SNMP ifIndex: 167
Link-level type: Controller , Clocking: Internal, Speed: T1, Loopback: None,
Framing: ESF, Parent: coc1-0/0/0:4 Interface index 229
Device flags : Present Running
Interface flags: Point-To-Point SNMP-Traps
Link flags : None
CoS queues : 4 supported
Last flapped : Never
DS1 alarms : None
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 23 on page 294](#).

**Figure 23: 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
 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, mp1s:
 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
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, 0.151, 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

```

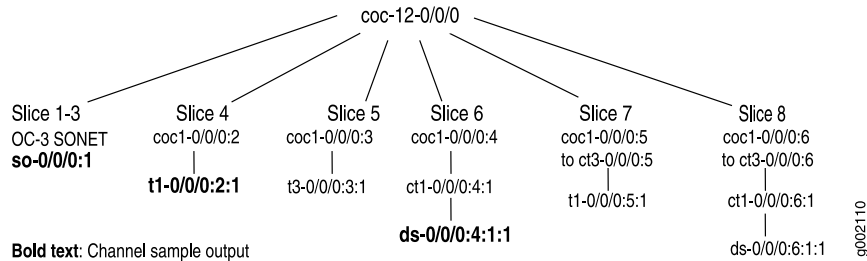
**Meaning** The first line of the output shows the status of the link. If this line shows that the physical link is up, the physical link is healthy and can pass packets. If this line shows that the physical link is down, the physical link is unhealthy and cannot pass packets. All four examples of output 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 24 on page 297 shows a visual representation of the different channel levels.

**Figure 24: 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.

## 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:

```

user@host> show interfaces tl-0/0/0:2:1 extensive
Physical interface: tl-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, 0.151, 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
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:
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:
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:
 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]
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.



## CHAPTER 28

# Use Loopback Testing for Channelized OC12 Interfaces

This chapter describes using loopback testing to isolate Channelized OC12 and Channelized OC12 IQ interface problems. The procedure for both types of Channelized OC12 interfaces is the same. The naming convention for the Channelized OC12 IQ interface varies depending on the type of interface. For a list of interface types associated with the Channelized OC12 IQ interface, see the [Junos OS Network Interfaces Configuration Guide](#).

- [Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces on page 303](#)
- [Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface on page 305](#)
- [Create a Loopback on page 305](#)
- [Verify That the Interface Is Up on page 306](#)
- [Clear Interface Statistics on page 309](#)
- [Force the Link Layer to Stay Up on page 309](#)
- [Verify the Status of the Logical Interface on page 311](#)
- [Ping the Channelized Interface on page 312](#)
- [Check for Interface Error Statistics on page 313](#)
- [Diagnose a Suspected Circuit Problem on page 315](#)

### Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces

---

- |                |                                                                                                                                                                                                        |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Purpose</b> | 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. |
| <b>Action</b>  | <a href="#">Table 61 on page 304</a> provides links and commands for using loopback testing to isolate Channelized OC12 and Channelized OC12 IQ interface problems.                                    |

**Table 61: Checklist for Using Loopback Testing for Channelized OC12 and Channelized OC12 IQ Interfaces**

| Tasks                                                                                                               | Command or Action                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>“Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface” on page 305</b> |                                                                                                                                              |
| 1. <a href="#">Create a Loopback on page 305</a>                                                                    |                                                                                                                                              |
| a. <a href="#">Create a Physical Loopback on page 305</a>                                                           | Connect the TX port to the RX port.                                                                                                          |
| b. <a href="#">Configure a Local Loopback on page 305</a>                                                           | <code>[edit interfaces t3-fpc/pic/port:channel t3 options]<br/>set loopback local<br/>show<br/>commit</code>                                 |
| 2. <a href="#">Verify That the Interface Is Up on page 306</a>                                                      | <code>show interfaces t3-fpc/pic/port:channel extensive</code>                                                                               |
| 3. <a href="#">Clear Interface Statistics on page 309</a>                                                           | <code>clear interfaces statistics t3-fpc/pic/port:channel</code>                                                                             |
| 4. <a href="#">Force the Link Layer to Stay Up on page 309</a>                                                      |                                                                                                                                              |
| a. <a href="#">Configure Encapsulation to Cisco-HDLC on page 310</a>                                                | <code>[edit interfaces t3-fpc/pic/port:channel]<br/>set encapsulation cisco-hdlc<br/>show<br/>commit</code>                                  |
| b. <a href="#">Configure No-Keepalives on page 310</a>                                                              | <code>[edit interfaces t3-fpc/pic/port:channel]<br/>set no-keepalives<br/>show<br/>commit</code>                                             |
| 5. <a href="#">Verify the Status of the Logical Interface on page 311</a>                                           | <code>show interfaces t3-fpc/pic/port:channel</code>                                                                                         |
| 6. <a href="#">Ping the Channelized Interface on page 312</a>                                                       | <code>ping interface t3-fpc/pic/port:channel local-IP-address<br/>bypass-routing count 1000 rapid</code>                                     |
| 7. <a href="#">Check for Interface Error Statistics on page 313</a>                                                 | <code>show interfaces t3-fpc/pic/port:channel extensive</code>                                                                               |
| <b>“Diagnose a Suspected Circuit Problem” on page 315</b>                                                           |                                                                                                                                              |
| 1. <a href="#">Loop the Entire T3 Interface Towards the Network on page 315</a>                                     | <code>[edit interfaces t3-fpc/pic/port:channel t3-options]<br/>set loopback remote<br/>show<br/>commit</code>                                |
| 2. <a href="#">Create a Loop to the Router from Various Points in the Network on page 316</a>                       | Perform Steps 2 through 8 from “Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface” on page 305. |

## Diagnose a Suspected Hardware Problem with a Channelized OC12 or Channelized OC12 IQ Interface

**Problem** To diagnose a suspected hardware problem with a Channelized OC12 or Channelized OC12 IQ interface, follow these steps:

- Solution**
- [Create a Loopback on page 305](#)
  - [Verify That the Interface Is Up on page 306](#)
  - [Clear Interface Statistics on page 309](#)
  - [Force the Link Layer to Stay Up on page 309](#)
  - [Verify the Status of the Logical Interface on page 311](#)
  - [Ping the Channelized Interface on page 312](#)
  - [Check for Interface Error Statistics on page 313](#)

## 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 Configuration Guide](#).

1. [Create a Physical Loopback on page 305](#)
2. [Configure a Local Loopback on page 305](#)

## 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:



**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.

## 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
 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  |    |
| 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.

- Related Documentation**
- [Checklist for Monitoring SONET Interfaces on page 127](#)
  - [Checklist for Using Loopback Testing for SONET Interfaces on page 135](#)
  - [List of Common SONET Alarms and Errors on page 149](#)

## 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>
```

**Meaning** This command clears the interface statistics counters for the Channelized OC12 interface only.

## 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 310](#)
2. [Configure No-Keepalives on page 310](#)

## 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
```

**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:

**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,
 Synchronization: SONET, Sync type: SONET, Sync status: Not Synchronized

 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.

**Related Documentation**

- [Checklist for Monitoring SONET Interfaces on page 127](#)
- [Checklist for Using Loopback Testing for SONET Interfaces on page 135](#)
- [List of Common SONET Alarms and Errors on page 149](#)

## 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*.

[illegible]

**Meaning** This command sends 1000 ping packets out of the channelized interface to the local IP address. The ping should complete successfully with no packet loss. If there is any persistent packet loss, open a case with the Juniper Networks Technical Assistance Center (JTAC) at [support@juniper.net](mailto:support@juniper.net), or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

## Check for Interface Error Statistics

**Purpose** Persistent interface error statistics indicate that you need to open a case with JTAC.

**Action** To check the local interface for error statistics, use the following Junos OS 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 the *Junos Network Interfaces Configuration Guide*.

**Sample Output**

```
user@host> show interfaces t3-0/3/0:11 extensive
Physical interface: t3-0/3/0:11, Enabled, Physical link is Up
 Interface index: 204, SNMP ifIndex: 129, Generation: 133
 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
 Hold-times : Up 0 ms, Down 0 ms
 CoS queues : 4 supported
 Last flapped : 2004-05-21 15:23:34 UTC (01:36:27 ago)
 Statistics last cleared: Never
 Traffic statistics:
 Input bytes : 109318 0 bps
 Output bytes: 109318 0 bps
 Input packets: 1669 0 pps
 Output packets: 1669 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: 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:
 PLL Lock Seconds Count State
 PHY Light 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 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 JTAC at [support@juniper.net](mailto: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 Towards the Network on page 315](#)
2. [Create a Loop to the Router from Various Points in the Network on page 316](#)

### Loop the Entire T3 Interface Towards 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
```

**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 305](#). 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.

## CHAPTER 29

# Locate Channelized OC12 Alarms and Errors

This chapter describes the most common Channelized OC12 alarms and errors encountered when investigating line problems on a Juniper Networks router.

- [Checklist for Channelized OC12 Alarms and Errors on page 317](#)
- [Display Channelized OC12 Alarms and Errors on page 317](#)
- [Display Channelized OC12 IQ Alarms and Errors on page 321](#)

## 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 62 on page 317](#) provides links and commands for Channelized OC12 alarms and errors.

Table 62: Checklist for Channelized OC12 Alarms and Errors

| Tasks                                                                       | Command or Action                                                    |
|-----------------------------------------------------------------------------|----------------------------------------------------------------------|
| <a href="#">“Display Channelized OC12 Alarms and Errors” on page 317</a>    | <code>show interfaces t3-fpc/pic/port:channel extensive</code>       |
| <a href="#">“Display Channelized OC12 IQ Alarms and Errors” on page 321</a> | <code>show interfaces interface-type-interface-name extensive</code> |

## 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 interface t3-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
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
 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 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 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 63 on page 320 shows T3 media-specific alarms or errors that can render the interface unable to pass packets.

**Table 63: 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                       |

For more details on T3 alarms and statistics, see [“Checklist of Common T3 Alarms and Errors” on page 67](#).

#### Related Documentation

For more information on diagnosing a T3 media problem, see:

- [Checklist for Monitoring T1 Interfaces on page 23](#)
- [Checklist for Using Loopback Testing for T3 Interfaces on page 55](#)
- [Checklist of Common T3 Alarms and Errors on page 67](#)

For more information about diagnosing a SONET layer problem, see

- [Checklist for Monitoring SONET Interfaces on page 127](#)
- [Checklist for Using Loopback Testing for SONET Interfaces on page 135](#)
- [List of Common SONET Alarms and Errors on page 149](#)

## 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
 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, mp1s:
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, 0.151, 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 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**
- [Checklist for Monitoring T1 Interfaces on page 23](#)
  - [Checklist for Monitoring T3 Interfaces on page 49](#)
  - [Checklist for Monitoring SONET Interfaces on page 127](#)

## PART 9

# Index

- [Index on page 327](#)



# Index

## A

- add/drop multiplexer *See* ADM
- address entries .....8
- Address Resolution Protocol *See* ARP
- address statement.....9
- ADM.....152
- AIS alarms
  - T1 interfaces .....45
  - T3 interfaces .....70
- AIS-P alarms
  - figure.....157
- alarms
  - AIS, locating.....156
  - AIS-L, locating .....157
  - AIS-P, locating .....156
  - ATM interfaces, checklist.....117
  - Channelized DS3 interfaces, checklist .....243
  - Channelized OC12 interfaces, checklist .....317
  - Channelized OC12 IQ interfaces, checklist .....317
  - Fast Ethernet interfaces, checklist.....209
  - Gigabit Ethernet interfaces, checklist.....209
  - LINK, displaying.....209
  - LOS, locating .....155
  - Multichannel DS3 interfaces, checklist .....275
  - SONET interfaces, checklist.....149
  - SONET network, figure.....153
  - T1 interfaces, checklist.....41
  - T3 interfaces, checklist.....67
  - yellow, locating.....45
- ARP configuration steps.....202
- ATM cells.....173
- ATM interfaces.....85
  - active alarms and defects, table.....124
  - alarms and errors
    - checklist.....117
    - See* SONET interfaces, alarms and errors.....117
  - circuit problems.....114
  - clear interfaces statistics command.....109
  - clocking, setting.....105
  - configuring local.....104
  - edit interfaces command.....105
  - edit interfaces sonet-options
    - command.....104, 114
  - edit interfaces t3-options command.....104, 114
  - error statistics.....110
  - extensive status .....87
  - input and output errors, table.....122
  - loopback
    - creating physical.....104
  - monitor checklist .....85
  - overview.....4
  - physical link
    - down, table.....108
    - status .....106
  - ping interface command.....109
  - set clocking internal command.....105
  - set loopback local command.....104
  - set loopback remote command.....114
  - show chassis hardware command .....77
  - show interfaces command.....106
  - show interfaces extensive command.....110, 118
  - show interfaces terse command.....86
  - statistics
    - checking errors.....110
    - resetting.....109
  - status
    - description, table .....86
    - extensive.....87
    - verifying.....106
  - transmit clock .....13
  - type, determining.....75
- ATM1 interfaces.....80
  - configuration, checking.....78
  - errors .....89
  - monitor checklist .....85
  - monitor interface command.....89
  - physical link down.....87
  - pic-type statement.....78
  - set cli terminal command.....90
  - show chassis hardware command .....77
  - show configuration interfaces command.....78
  - show interfaces command.....87
  - show interfaces extensive command.....87
  - statistics, monitoring.....89
  - status
    - displaying for specific.....87
    - extensive.....87

|                                            |     |
|--------------------------------------------|-----|
| ATM2 IQ interfaces.....                    | 81  |
| configuration checking .....               | 78  |
| errors.....                                | 98  |
| maximum-vcs statement.....                 | 78  |
| monitor checklist .....                    | 85  |
| monitor interface command.....             | 98  |
| overview.....                              | 5   |
| physical link up.....                      | 93  |
| promiscuous mode.....                      | 82  |
| set cli terminal command.....              | 99  |
| show chassis hardware command.....         | 77  |
| show configuration interfaces command..... | 78  |
| show interfaces command.....               | 91  |
| show interfaces extensive command.....     | 93  |
| show interfaces terse command.....         | 91  |
| status                                     |     |
| displaying for specific.....               | 91  |
| extensive.....                             | 93  |
| autonegotiation, table.....                | 193 |

## C

|                                                   |               |
|---------------------------------------------------|---------------|
| cables                                            |               |
| damaged or dirty.....                             | 108, 141, 202 |
| mismatch.....                                     | 108, 140, 202 |
| multimode fiber.....                              | 195           |
| single-mode fiber.....                            | 104, 137, 195 |
| CCC, protocol family .....                        | 9             |
| cell-payload scrambling.....                      | 174           |
| channel, Channelized OC12 IQ interfaces .....     | 295           |
| channelization levels, controller interface ..... | 294           |
| Channelized DS3 interfaces                        |               |
| alarms and errors.....                            | 243           |
| circuit problem .....                             | 240           |
| clear interfaces statistics command.....          | 235           |
| edit interfaces command.....                      | 235, 237      |
| edit interfaces t1-options command .....          | 233, 241      |
| edit interfaces t3-options command.....           | 233           |
| encapsulation, configuring.....                   | 235           |
| errors .....                                      | 227           |
| link layer, forcing up.....                       | 235           |
| local loopback, configuring.....                  | 233           |
| logical interface .....                           | 237           |
| loopback, configuring                             |               |
| from specific T1 interface.....                   | 241           |
| monitor interface command .....                   | 227           |
| monitor, checklist.....                           | 217           |
| no keepalives, configuring.....                   | 237           |
| notification messages.....                        | 246           |
| physical link status.....                         | 219, 234      |

|                                           |               |
|-------------------------------------------|---------------|
| physical loopback, creating .....         | 233           |
| ping interface command.....               | 238           |
| set encapsulation command.....            | 236           |
| set loopback local command.....           | 233           |
| set loopback remote command.....          | 241           |
| set no-keepalives command.....            | 237           |
| show interfaces command.....              | 219, 234, 237 |
| show interfaces extensive                 |               |
| command.....                              | 222, 238, 243 |
| show interfaces terse command.....        | 218           |
| statistics                                |               |
| checking error.....                       | 238           |
| monitoring .....                          | 227           |
| resetting.....                            | 235           |
| status                                    |               |
| displaying .....                          | 218, 234      |
| displaying specific .....                 | 219, 222      |
| extensive .....                           | 222           |
| logical interface, verifying.....         | 237           |
| t1-options statement.....                 | 233, 241      |
| t3-options statement.....                 | 233           |
| channelized DS3 to DS0 interfaces         |               |
| alarms and errors .....                   | 278           |
| clear interfaces statistics command.....  | 264           |
| logical interface .....                   | 265           |
| monitor interfaces command .....          | 255           |
| ping interface command.....               | 267           |
| show interfaces command.....              | 262, 265      |
| show interfaces extensive                 |               |
| command.....                              | 267, 278      |
| channelized DS3 to DS1 interfaces         |               |
| alarms and errors .....                   | 275           |
| show interfaces command.....              | 234, 263, 265 |
| show interfaces extensive command.....    | 275           |
| channelized interfaces.....               | 249           |
| Channelized DS3, status, displaying.....  | 218           |
| errors.....                               | 227, 255, 288 |
| Multichannel DS3, status, displaying..... | 250           |
| naming                                    |               |
| DS3 to DS0.....                           | 12            |
| DS3 to DS1.....                           | 12            |
| notification messages.....                | 277           |
| OC12 IQ status, displaying.....           | 289           |
| OC12 status, displaying.....              | 284           |
| overview.....                             | 6             |
| physical link down .....                  | 285           |
| statistics monitoring .....               | 255           |
| status.....                               | 234, 262, 306 |
| extensive.....                            | 222, 252, 297 |

## Channelized OC12 interfaces

|                                          |               |
|------------------------------------------|---------------|
| alarms .....                             | 320           |
| alarms and errors .....                  | 317           |
| checklist for alarms.....                | 317           |
| circuit problem .....                    | 315           |
| clear interfaces statistics command..... | 309           |
| defects.....                             | 320           |
| edit interfaces command .....            | 310           |
| edit interfaces t3-options command ..... | 316           |
| encapsulation, configuring .....         | 310           |
| errors.....                              | 288, 320      |
| link layer, forcing up .....             | 309           |
| local loopback, configuring .....        | 305           |
| logical interface .....                  | 311           |
| loopback, configuring                    |               |
| for entire T3 interface .....            | 315           |
| monitor                                  |               |
| checklist.....                           | 283           |
| statistics.....                          | 288           |
| monitor interface command.....           | 300           |
| no keepalives, configuring .....         | 310           |
| physical link status.....                | 285, 306      |
| physical loopback, creating .....        | 305           |
| ping interface command .....             | 312           |
| set cli terminal command.....            | 288           |
| set encapsulation command .....          | 310           |
| set loopback local command .....         | 306           |
| set loopback remote command .....        | 316           |
| set no-keepalives command .....          | 311           |
| show command .....                       | 306           |
| show interfaces coc1 command.....        | 293           |
| show interfaces coc12 command.....       | 293           |
| show interfaces command.....             | 285, 306      |
| show interfaces ct1 command.....         | 294           |
| show interfaces ct3 command.....         | 294           |
| show interfaces extensive                |               |
| command.....                             | 285, 313, 317 |
| show interfaces terse command.....       | 284           |
| statistics                               |               |
| checking error .....                     | 313           |
| monitoring .....                         | 288           |
| resetting .....                          | 309           |
| status                                   |               |
| displaying .....                         | 306           |
| displaying for specific.....             | 285           |
| extensive.....                           | 285           |
| logical interface, verifying .....       | 311           |
| t3-options statement .....               | 306, 316      |

## Channelized OC12 IQ interfaces

|                                         |               |
|-----------------------------------------|---------------|
| alarms and errors .....                 | 321           |
| checklist for alarms .....              | 317           |
| circuit problem .....                   | 315           |
| configuration.....                      | 291           |
| figure .....                            | 291           |
| controller interface.....               | 291           |
| channelization levels.....              | 294           |
| status, displaying.....                 | 293, 294      |
| edit interfaces command.....            | 310           |
| edit interfaces t3-options command..... | 316           |
| encapsulation, configuring .....        | 310           |
| errors.....                             | 300           |
| hierarchy.....                          | 291           |
| individual channels down.....           | 291           |
| link layer, forcing up.....             | 309           |
| local loopback, configuring .....       | 305           |
| logical interface .....                 | 311           |
| loopback, configuring                   |               |
| for entire T3 interface.....            | 315           |
| monitor checklist .....                 | 283           |
| no keepalives, configuring.....         | 310           |
| physical link status.....               | 291, 306      |
| physical loopback, creating .....       | 305           |
| ping interface command .....            | 312           |
| set encapsulation command.....          | 310           |
| set loopback local command.....         | 306           |
| set loopback remote command.....        | 316           |
| set no-keepalives command.....          | 311           |
| show command .....                      | 306           |
| show interfaces command .....           | 293, 295, 306 |
| show interfaces controller command..... | 289           |
| show interfaces extensive .....         | 313           |
| show interfaces extensive command.....  | 321           |
| show interfaces terse coc command.....  | 289           |
| show interfaces terse command.....      | 290           |
| specific                                |               |
| channel, displaying status.....         | 295           |
| figure.....                             | 297           |
| statistics                              |               |
| checking error.....                     | 313           |
| monitoring .....                        | 300           |
| resetting.....                          | 309           |
| status                                  |               |
| displaying.....                         | 306           |
| displaying for specific.....            | 295           |
| extensive.....                          | 297           |
| logical interface, verifying.....       | 311           |
| t3-options statement.....               | 316           |

|                                                                        |          |
|------------------------------------------------------------------------|----------|
| checklist for alarms                                                   |          |
| ATM interfaces.....                                                    | 117      |
| Channelized DS3 alarms .....                                           | 243      |
| Channelized OC12 interfaces .....                                      | 317      |
| Channelized OC12 IQ interfaces .....                                   | 317      |
| Fast Ethernet interfaces .....                                         | 209      |
| Gigabit Ethernet interfaces .....                                      | 209      |
| Multichannel DS3 alarms.....                                           | 275      |
| SONET interfaces.....                                                  | 149      |
| T1 interfaces.....                                                     | 41       |
| T3 interfaces.....                                                     | 67       |
| checklist for monitoring                                               |          |
| ATM1 interfaces .....                                                  | 85       |
| ATM2 IQ interfaces.....                                                | 85       |
| Channelized DS3 interfaces .....                                       | 217      |
| Channelized OC12 interfaces .....                                      | 283      |
| Channelized OC12 IQ interfaces .....                                   | 283      |
| Fast Ethernet interfaces.....                                          | 187      |
| Gigabit Ethernet interfaces.....                                       | 187      |
| Multichannel DS3 interfaces .....                                      | 249      |
| SONET interfaces .....                                                 | 127      |
| T1 interfaces.....                                                     | 23       |
| T3 interfaces.....                                                     | 49       |
| checklist for payload scrambling, SONET .....                          | 173      |
| checklist for SONET frame checksum .....                               | 177      |
| checksum, SONET frame.....                                             | 177      |
| circuit cross-connect CCC, protocol family See CCC,<br>protocol family |          |
| circuit problems                                                       |          |
| ATM interfaces .....                                                   | 114      |
| Channelized DS3 interfaces.....                                        | 240      |
| Channelized OC12 interfaces .....                                      | 315      |
| Channelized OC12 IQ interfaces.....                                    | 315      |
| Fast Ethernet interfaces .....                                         | 207      |
| Gigabit Ethernet interfaces .....                                      | 207      |
| SONET interfaces .....                                                 | 147      |
| T1 interfaces .....                                                    | 39       |
| T3 interfaces .....                                                    | 65       |
| Cisco-HDLC, configuring encapsulation                                  |          |
| SONET interfaces.....                                                  | 142      |
| T1 interfaces.....                                                     | 34       |
| T3 interfaces .....                                                    | 60       |
| clear interfaces statistics command                                    |          |
| ATM interfaces.....                                                    | 109      |
| Channelized DS3 interfaces.....                                        | 235      |
| channelized DS3 to DS0 interfaces .....                                | 264      |
| Channelized OC12 interfaces.....                                       | 309      |
| Fast Ethernet interfaces.....                                          | 195      |
| Fast Ethernet statistics.....                                          | 204      |
| SONET interfaces.....                                                  | 132, 141 |
| T1 interfaces.....                                                     | 34       |
| T3 interfaces.....                                                     | 60       |
| clock                                                                  |          |
| location of onboard, table .....                                       | 171      |
| clock sources                                                          |          |
| figure .....                                                           | 14       |
| clocking.....                                                          | 105      |
| ATM interfaces.....                                                    | 105      |
| SONET interfaces .....                                                 | 138      |
| T1 interfaces.....                                                     | 32       |
| T3 interfaces .....                                                    | 58       |
| clocking statement, usage guidelines.....                              | 14       |
| commands for router management,<br>interfaces.....                     | 16, 17   |
| configuration, interfaces                                              |          |
| ATM interfaces, incorrect.....                                         | 79       |
| Channelized OC12 IQ .....                                              | 291      |
| checking                                                               |          |
| ATM1 interfaces .....                                                  | 78       |
| ATM2 IQ interfaces .....                                               | 78       |
| connections, verifying.....                                            | 115      |
| connectors, network, and interface names .....                         | 10       |
| controller interface                                                   |          |
| Channelized OC12 IQ interfaces .....                                   | 291, 293 |
| levels of channelization, figure .....                                 | 294      |
| show interfaces command.....                                           | 293      |
| counters.....                                                          | 204      |
| craft interface, LED alarms.....                                       | 123      |
| cumulative statistics                                                  |          |
| Ethernet interfaces.....                                               | 195      |
| SONET interfaces.....                                                  | 132      |
| customer support.....                                                  | xxix     |
| contacting JTAC.....                                                   | xxix     |
| <b>D</b>                                                               |          |
| data integrity.....                                                    | 173      |
| delete fcs 32 command .....                                            | 182      |
| descriptors, configuring .....                                         | 8        |
| documentation                                                          |          |
| comments on.....                                                       | xxviii   |
| downstream, SONET alarms and errors,<br>defining.....                  | 153      |
| DS0 interface.....                                                     | 296      |
| <b>E</b>                                                               |          |
| edit interfaces command.....                                           | 13, 17   |
| ATM interfaces .....                                                   | 105      |
| Channelized DS3 interfaces .....                                       | 235, 237 |



- Channelized OC12 interfaces .....310
- Channelized OC12 IQ interfaces .....310
- Fast Ethernet interfaces .....203
- Gigabit Ethernet interfaces .....203
- Multichannel DS3 interfaces .....264, 265
- SONET interfaces .....139, 142, 143, 182
- T1 interfaces .....32, 34, 35
- T3 interfaces .....58, 60, 61
- edit interfaces fastether-options command .....200
- edit interfaces gigether-options command.....200
- edit interfaces sonet-options command
  - ATM interfaces.....104, 114
  - SONET interfaces.....138, 147, 176
- edit interfaces t1-options command
  - Channelized DS3 interfaces .....233, 241
  - Multichannel DS3 interfaces .....261, 272
  - T1 interfaces .....31, 39
- edit interfaces t3-options command
  - ATM interfaces .....104, 114
  - Channelized DS3 interfaces .....233
  - Channelized OC12 interfaces .....306, 316
  - Channelized OC12 IQ interfaces.....306, 316
  - Multichannel DS3 interfaces .....261, 271
  - T3 interfaces .....57, 65
- encapsulation
  - SONET interfaces .....142
  - T1 interfaces.....34
  - T3 interfaces.....60
- error statistics
  - ATM interfaces.....110
  - Fast Ethernet interfaces .....205
  - Gigabit Ethernet interfaces.....205
  - OC3 ATM interfaces.....120
  - SONET interfaces .....145
  - T1 interfaces .....37
  - T3 ATM interfaces.....121
  - T3 interfaces .....63
- errors
  - ATM2 IQ interfaces.....98
  - Channelized DS3 interfaces .....227
  - channelized interfaces .....255
  - Channelized OC12 interfaces .....288
  - Channelized OC12 IQ interfaces .....300
  - Ethernet interfaces.....195
  - Fast Ethernet interfaces, table .....192
  - Gigabit Ethernet interfaces, table .....192
  - SONET interfaces.....131
  - T1 interfaces.....41
  - T3 interfaces.....52, 63
- Ethernet interfaces
  - autonegotiation, table.....193
  - RJ-45 .....199
  - specifications, table.....195
- F**
  - family
    - descriptors .....8
    - statement.....9
  - Fast Ethernet interfaces
    - alarms, LINK.....209
    - autonegotiation, table.....193
    - circuit problems.....195, 207
    - clear interfaces statistics command.....204
    - counters .....209, 211
    - edit interfaces command .....203
    - LINK alarms, checklist .....209
    - local loopback, configuring .....200
    - monitor checklist.....187
    - monitor interface command .....194
    - monitoring.....194
    - overview.....5
    - physical loopback.....199
    - ping interface command.....204
    - set arp command .....203
    - set cli terminal command .....195
    - set loopback local command .....200
    - show interfaces command .....190, 201, 205
    - show interfaces extensive command.....191, 209
    - show interfaces terse command .....188
    - static ARP entry, configuring .....202
    - statistics
      - checking error .....205
      - monitoring.....205
      - resetting.....204
    - status
      - description, table.....189
      - displaying.....188
      - errors, table.....192
      - verifying.....201
  - fiber-optic
    - connection.....195
    - Ethernet interface specifications, table.....195
    - interface, physical loopback.....199
  - Flexible PIC Concentrator FPC See FPC
  - Forwarding Module SFM See SFM
  - FPC .....171
  - frame checksum, SONET interfaces .....177

|                                                      |     |
|------------------------------------------------------|-----|
| frame error control, SONET interfaces overview ..... | 178 |
| frames, SONET .....                                  | 152 |
| framing errors                                       |     |
| SONET interfaces.....                                | 132 |
| T3 interfaces.....                                   | 53  |

## G

|                                        |          |
|----------------------------------------|----------|
| Gigabit Ethernet interfaces            |          |
| alarms, LINK.....                      | 209      |
| autonegotiation, table.....            | 193      |
| circuit problems.....                  | 207      |
| counters.....                          | 209, 211 |
| edit interfaces command.....           | 203      |
| LINK alarms, checklist .....           | 209      |
| local loopback, configuring.....       | 200      |
| loopback plug, creating.....           | 199      |
| monitor checklist.....                 | 187      |
| monitor interface command.....         | 194      |
| monitoring.....                        | 194      |
| overview.....                          | 5        |
| physical loopback, creating .....      | 199      |
| ping interface command.....            | 204      |
| set arp command .....                  | 203      |
| set cli terminal command.....          | 195      |
| set loopback local command.....        | 200      |
| show interfaces command.....           | 190, 201 |
| show interfaces extensive command..... | 191, 209 |
| show interfaces terse command.....     | 189      |
| static ARP entry, configuring .....    | 202      |
| statistics                             |          |
| checking error.....                    | 205      |
| monitoring.....                        | 205      |
| resetting.....                         | 204      |
| status                                 |          |
| description, table.....                | 189      |
| displaying specific.....               | 190      |
| errors, table.....                     | 192      |
| extensive.....                         | 191      |
| verifying.....                         | 201      |
| GR-253 CORE.....                       | 149      |

## H

|                                      |     |
|--------------------------------------|-----|
| HDLC                                 |     |
| configuring encapsulation            |     |
| SONET interfaces .....               | 142 |
| T1 interfaces .....                  | 34  |
| T3 interfaces .....                  | 60  |
| payload scrambling                   |     |
| SONET interfaces, checking .....     | 174 |
| hierarchy                            |     |
| Channelized OC12 IQ interfaces ..... | 291 |
| SONET .....                          | 152 |

## I

|                                                 |        |
|-------------------------------------------------|--------|
| IDLE signal, T3 interfaces .....                | 71     |
| input keepalives, SONET interfaces.....         | 132    |
| interface names                                 |        |
| examples.....                                   | 11     |
| logical part.....                               | 10     |
| physical part.....                              | 10     |
| separators.....                                 | 10     |
| interfaces                                      |        |
| alarms .....                                    | 18     |
| descriptors .....                               | 8      |
| displaying order in configurations.....         | 13     |
| investigation process .....                     | 16, 18 |
| locating alarms.....                            | 18     |
| loopback test commands, table.....              | 17     |
| monitoring commands, table.....                 | 16     |
| monitoring, general steps.....                  | 16     |
| names and naming.....                           | 9, 12  |
| slot, PIC, and port locations.....              | 11     |
| supported by Junos OS, table.....               | 6      |
| interfaces statement.....                       | 9      |
| International Organization for Standardization, |        |
| protocol family See ISO, protocol family        |        |
| Internet Protocol, version 4 See IPv4           |        |
| Internet Protocol, version 6 See IPv6           |        |
| investigation process.....                      | 3      |
| interfaces.....                                 | 16, 18 |
| IPv4 .....                                      | 9      |
| IPv6 .....                                      | 9      |
| ISO, protocol family .....                      | 9      |

## J

|                                             |   |
|---------------------------------------------|---|
| Junos OS, supported interfaces, table ..... | 6 |
|---------------------------------------------|---|

## K

|                             |     |
|-----------------------------|-----|
| keepalives, disabling ..... | 143 |
|-----------------------------|-----|

**L**

|                                     |     |
|-------------------------------------|-----|
| line overhead bytes .....           | 152 |
| line-terminating equipment See LTE  |     |
| lines, SONET .....                  | 152 |
| link layer, forcing up              |     |
| SONET interfaces.....               | 142 |
| T1 interfaces .....                 | 34  |
| T3 interfaces .....                 | 60  |
| link stability.....                 | 175 |
| LOF alarms                          |     |
| T3 interfaces                       |     |
| alarms and errors.....              | 69  |
| logical interfaces                  |     |
| descriptors.....                    | 8   |
| SONET interfaces, status.....       | 144 |
| T3 interfaces, status.....          | 62  |
| logical part, interface name .....  | 10  |
| loopback test, checklists           |     |
| ATM1 interfaces .....               | 101 |
| ATM2 IQ interfaces.....             | 101 |
| Channelized DS3 interfaces.....     | 231 |
| Fast Ethernet interfaces.....       | 197 |
| Gigabit Ethernet interfaces.....    | 197 |
| Multichannel DS3 interfaces.....    | 259 |
| SONET interfaces.....               | 135 |
| T1 interfaces.....                  | 29  |
| T3 interfaces.....                  | 55  |
| loopback, configuring local.....    | 104 |
| ATM interfaces .....                | 104 |
| ATM interfaces, figure .....        | 104 |
| Channelized DS3 interfaces.....     | 233 |
| Channelized OC12 interfaces .....   | 305 |
| Channelized OC12 IQ interfaces..... | 305 |
| Fast Ethernet interfaces .....      | 200 |
| Gigabit Ethernet interfaces.....    | 200 |
| Multichannel DS3 interfaces.....    | 261 |
| T1 interfaces .....                 | 31  |
| T3 interfaces .....                 | 57  |
| loopback, creating physical         |     |
| ATM interfaces .....                | 104 |
| Channelized DS3 interfaces.....     | 233 |
| Channelized OC12 interfaces .....   | 305 |
| Channelized OC12 IQ interfaces..... | 305 |
| Fast Ethernet interfaces .....      | 199 |
| Gigabit Ethernet interfaces .....   | 199 |
| Multichannel DS3 interfaces.....    | 261 |
| T1 interfaces .....                 | 31  |
| T3 interfaces .....                 | 57  |
| loopback, plug.....                 | 199 |

## LOS alarms

|                       |     |
|-----------------------|-----|
| SONET interfaces..... | 155 |
| T3 interfaces .....   | 69  |
| LTE.....              | 152 |

**M**

## manuals

|                            |        |
|----------------------------|--------|
| comments on.....           | xxviii |
| maximum-vcs statement..... | 78     |
| ATM2 IQ interfaces .....   | 78     |
| MCS .....                  | 171    |

## Miscellaneous Control Subsystem See MCS

## monitor interface command

|                                        |     |
|----------------------------------------|-----|
| ATM1 interface.....                    | 89  |
| ATM2 IQ interfaces.....                | 98  |
| Channelized DS3 interfaces .....       | 227 |
| channelized DS3 to DS0 interfaces..... | 255 |
| Channelized OC12 interfaces.....       | 288 |
| Channelized OC12 IQ interfaces .....   | 300 |
| Fast Ethernet interfaces .....         | 194 |
| Gigabit Ethernet interfaces.....       | 194 |
| SONET interfaces.....                  | 131 |
| T1 interfaces.....                     | 26  |
| T3 interfaces.....                     | 52  |

## Multichannel DS3 interfaces

|                                          |          |
|------------------------------------------|----------|
| alarms and errors.....                   | 275, 278 |
| checklist for alarms.....                | 275      |
| clear interface statistics command.....  | 264      |
| edit interfaces command.....             | 264, 265 |
| edit interfaces t1-options command ..... | 261, 272 |
| edit interfaces t3-options command.....  | 261, 271 |
| encapsulation, configuring.....          | 264      |
| errors.....                              | 255      |
| link layer, forcing up.....              | 264      |
| local loopback, configuring.....         | 261      |
| loopback, configuring                    |          |
| for entire T3 interface.....             | 271      |
| from specific T1 interface.....          | 272      |

## monitor

|                                   |               |
|-----------------------------------|---------------|
| channelized.....                  | 255           |
| checklist.....                    | 249           |
| monitor interfaces command.....   | 255           |
| no keepalives, configuring.....   | 265           |
| physical link status.....         | 250, 257, 262 |
| physical loopback, creating ..... | 261           |
| ping interface command.....       | 266           |
| problems, table.....              | 257           |
| set cli terminal command.....     | 256           |
| set encapsulation command.....    | 264           |

|                                        |          |
|----------------------------------------|----------|
| set loopback local command.....        | 261      |
| set loopback remote command.....       | 271, 272 |
| set no-keepalives command.....         | 265      |
| show command.....                      | 262      |
| show interfaces command.....           | 262, 263 |
| show interfaces extensive              |          |
| command.....                           | 267, 278 |
| statistics                             |          |
| checking error.....                    | 267      |
| monitoring.....                        | 255      |
| resetting.....                         | 263      |
| status                                 |          |
| displaying.....                        | 250, 262 |
| displaying specific.....               | 250      |
| extensive.....                         | 252      |
| logical interface, verifying.....      | 265      |
| t1-options statement.....              | 261, 272 |
| t3-options statement.....              | 261, 271 |
| Multilink Frame Relay See MLFR         |          |
| Multilink PPP See MLPPP                |          |
| multimode fiber cable.....             | 195      |
| Multiprotocol Label Switching See MPLS |          |

## N

|                                              |                                 |
|----------------------------------------------|---------------------------------|
| naming                                       |                                 |
| channelized interfaces .....                 | 12                              |
| interfaces.....                              | 9, 12                           |
| network.....                                 | 39, 65, 114, 147, 240, 271, 315 |
| network connectors, and interface names..... | 10                              |
| no-keepalives, configuring                   |                                 |
| SONET interfaces .....                       | 143                             |
| T1 interfaces .....                          | 35                              |
| T3 interfaces .....                          | 61                              |
| notification messages, logging for.....      | 246, 277                        |

## O

|                                          |               |
|------------------------------------------|---------------|
| OC1 interface.....                       | 296           |
| OC3 ATM interface                        |               |
| extensive output.....                    | 110           |
| status.....                              | 107           |
| OC3 SONET interface.....                 | 296           |
| onboard clock.....                       | 171           |
| optical attenuation.....                 | 108, 141, 202 |
| output keepalives, SONET interfaces..... | 132           |

## P

|                                    |     |
|------------------------------------|-----|
| path area, SONET interfaces.....   | 152 |
| path overhead bytes .....          | 152 |
| path-terminating equipment See PTE |     |

|                                          |          |
|------------------------------------------|----------|
| payload                                  |          |
| scrambling                               |          |
| checking .....                           | 174      |
| configuring .....                        | 175      |
| SONET interfaces .....                   | 173      |
| status.....                              | 175      |
| SONET interfaces.....                    | 152      |
| physical interfaces, descriptors.....    | 8        |
| physical link down                       |          |
| ATM interfaces, table.....               | 108      |
| ATM1 interfaces .....                    | 87       |
| Channelized DS3 interfaces.....          | 221      |
| channelized interfaces.....              | 251, 285 |
| Fast Ethernet interfaces, table.....     | 202      |
| Gigabit Ethernet interfaces, table.....  | 202      |
| Multichannel DS3 interfaces, table ..... | 257      |
| SONET interfaces.....                    | 129, 140 |
| table.....                               | 140      |
| T1 interfaces.....                       | 25       |
| table.....                               | 27       |
| T3 interfaces.....                       | 51       |
| table.....                               | 53       |
| physical link up                         |          |
| ATM2 IQ interfaces .....                 | 93       |
| Channelized DS3 interfaces.....          | 221      |
| channelized interfaces.....              | 251      |
| Channelized OC12 IQ interfaces.....      | 291      |
| Fast Ethernet interfaces.....            | 190, 201 |
| Gigabit Ethernet interfaces.....         | 190, 201 |
| SONET interfaces .....                   | 139      |
| T1 interfaces.....                       | 25       |
| T3 interfaces.....                       | 51, 59   |
| physical loopback                        |          |
| ATM interfaces.....                      | 104      |
| Channelized DS3 interfaces .....         | 233      |
| channelized interfaces .....             | 261, 305 |
| Fast Ethernet interfaces.....            | 199      |
| Gigabit Ethernet interfaces.....         | 199      |
| SONET interfaces .....                   | 137      |
| T1 interfaces.....                       | 31       |
| T3 interfaces.....                       | 57       |
| physical part, interface name .....      | 10       |
| pic-type statement                       |          |
| ATM1 interfaces .....                    | 78       |
| ping interface command                   |          |
| ATM interfaces.....                      | 109      |
| Channelized DS3 interfaces .....         | 238      |
| channelized interfaces .....             | 266, 312 |
| Fast Ethernet interfaces.....            | 204      |

- Gigabit Ethernet interfaces .....204
- SONET interfaces .....145
- T1 interfaces.....37
- T3 interfaces.....63
- problems
  - ATM interfaces, table.....108
  - channelized interfaces, table.....257
  - T1 interfaces, table.....27, 257
- promiscuous mode, ATM2 IQ interfaces.....82
- properties, for physical interfaces.....8
- protocol families, supported.....9
- PTE.....152
- R**
  - red alarm bell.....123
  - repeaters.....152
  - RJ-45 Ethernet interface.....199
  - routers, path-terminating equipment.....152
- S**
  - SBR .....171
  - SCB .....171
  - SCG .....171
  - scrambling, SONET payload.....173
  - section overhead
    - bytes.....152
  - section-terminating equipment See STE
  - separators, in interface names .....10
  - set arp command
    - Fast Ethernet interfaces .....203
    - Gigabit Ethernet interfaces.....203
  - set cli terminal command
    - ATM1 interfaces .....90
    - ATM2 IQ interfaces .....99
    - Channelized OC12 interfaces .....288
    - Fast Ethernet interfaces .....195
    - Gigabit Ethernet interfaces .....195
    - Multichannel DS3 interfaces .....256
    - SONET interfaces .....132
    - T1 interfaces .....27
    - T3 interfaces .....53
  - set clocking internal command
    - ATM interfaces .....105
    - SONET interfaces .....139
    - T1 interfaces .....32
    - T3 interfaces .....58
  - set encapsulation command
    - Channelized DS3 interfaces .....236
    - Channelized OC12 interfaces .....310
    - Channelized OC12 IQ interfaces .....310
    - Multichannel DS3 interfaces .....264
    - SONET interfaces .....142
    - T1 interfaces .....34
    - T3 interfaces .....60
  - set fcs 16 command.....183
  - set fcs 32 command .....183
  - set loopback local command
    - ATM interfaces .....104
    - Channelized DS3 interfaces .....233
    - Channelized OC12 interfaces .....306
    - Channelized OC12 IQ interfaces .....306
    - Fast Ethernet interfaces .....200
    - Gigabit Ethernet interfaces .....200
    - Multichannel DS3 interfaces .....261
    - SONET interfaces.....138
    - T1 interfaces .....31
    - T3 interfaces .....57
  - set loopback remote command
    - ATM interfaces .....114
    - Channelized DS3 interfaces .....241
    - Channelized OC12 interfaces .....316
    - Channelized OC12 IQ interfaces .....316
    - Multichannel DS3 interfaces .....271, 272
    - SONET interfaces .....147
    - T1 interfaces .....39
    - T3 interfaces .....65
  - set no-keepalives command
    - Channelized DS3 interfaces .....237
    - Channelized OC12 interfaces .....311
    - Channelized OC12 IQ interfaces .....311
    - Multichannel DS3 interfaces .....265
    - SONET interfaces .....143
    - T1 interfaces .....35
    - T3 interfaces .....61
  - set payload-scrambler command .....176, 183
  - set rfc-2615 command .....183
  - SFM .....171
  - show chassis hardware command.....77
  - show command .....262, 306
  - show configuration command .....174
  - show configuration interfaces command
    - ATM1 interfaces .....78, 80
    - ATM2 IQ interfaces .....78, 81
    - SONET interfaces .....174
  - show interfaces coc1 command .....293
  - show interfaces coc12 command .....293

|                                          |                    |                                           |                    |
|------------------------------------------|--------------------|-------------------------------------------|--------------------|
| show interfaces command.....             | 62, 174, 203       | SONET clock generatorSys See SCG          |                    |
| ATM interfaces.....                      | 106                | SONET frames.....                         | 152                |
| ATM1 interfaces .....                    | 87                 | line overhead bytes.....                  | 152                |
| ATM2 IQ interfaces .....                 | 91                 | path overhead bytes.....                  | 152                |
| Channelized DS3 interfaces .....         | 219, 234, 237      | section overhead bytes.....               | 152                |
| channelized DS3 to DS0 interfaces .....  | 262, 265           | SONET interfaces.....                     | 183                |
| Channelized OC12 interfaces .....        | 285, 306, 311      | alarms and errors                         |                    |
| Channelized OC12 IQ interfaces .....     | 293, 295, 306, 311 | AIS-P alarms.....                         | 156                |
| controller interface .....               | 293                | displaying.....                           | 151                |
| DS3 to DS1 interfaces .....              | 234, 263           | LOS alarms .....                          | 155                |
| Fast Ethernet interfaces .....           | 190, 201, 205      | path signal label assignments, table..... | 166                |
| Gigabit Ethernet interfaces .....        | 190, 201           | PLM-P alarms.....                         | 164                |
| SONET interfaces.....                    | 128, 139, 144, 174 | RDI-L alarms.....                         | 159                |
| T1 interfaces.....                       | 25, 33, 36         | RDI-P alarms.....                         | 158                |
| T3 interfaces.....                       | 51, 59             | REI-L alarms.....                         | 161                |
| show interfaces controller command ..... | 289                | REI-P alarms.....                         | 160                |
| show interfaces ct1 command .....        | 294                | alarms and errors checklist.....          | 149                |
| show interfaces ct3 command .....        | 294                | circuit problems.....                     | 147                |
| show interfaces extensive command.....   | 41, 141            | clear interfaces statistics command.....  | 141                |
| ATM interfaces.....                      | 110, 118           | clocking                                  |                    |
| ATM1 interfaces.....                     | 87                 | setting.....                              | 138                |
| ATM2 IQ interfaces.....                  | 93                 | delete fcs 32 command.....                | 182                |
| Channelized DS3 interfaces.....          | 222, 238, 243      | displaying for specific.....              | 128                |
| channelized DS3 to DS0 interfaces.....   | 267, 278           | edit interfaces command.....              | 139, 142, 143, 182 |
| channelized DS3 to DS1 interfaces.....   | 275                | edit interfaces sonet-options             |                    |
| Channelized OC12 interfaces.....         | 285, 313, 317      | command.....                              | 138, 147, 176      |
| Channelized OC12 IQ interfaces.....      | 313, 321           | encapsulation, configuring.....           | 142                |
| Fast Ethernet interfaces.....            | 191, 209           | error statistics.....                     | 145                |
| Gigabit Ethernet interfaces.....         | 191                | frame.....                                | 152                |
| SONET interfaces.....                    | 130, 146, 151, 155 | checksum checklist .....                  | 177                |
| T1 interfaces.....                       | 25, 38             | error control.....                        | 178                |
| T3 interfaces.....                       | 51, 63             | further investigation.....                | 128                |
| show interfaces terse coc command .....  | 289                | HDLC payload scrambling.....              | 174                |
| show interfaces terse command            |                    | line area.....                            | 152                |
| ATM interfaces.....                      | 86                 | link layer, forcing up.....               | 142                |
| ATM1 interfaces .....                    | 80                 | logical interface, status.....            | 144                |
| ATM2 IQ interfaces .....                 | 81, 91             | loopback                                  |                    |
| Channelized DS3 interfaces .....         | 218                | configuring local.....                    | 138                |
| Channelized OC12 interfaces .....        | 284                | creating physical.....                    | 137                |
| Channelized OC12 IQ interfaces .....     | 290                | monitor checklist.....                    | 127                |
| Fast Ethernet interfaces .....           | 188                | no keepalives                             |                    |
| Gigabit Ethernet interfaces.....         | 189                | configuring.....                          | 143                |
| SONET interfaces.....                    | 128, 144           | setting.....                              | 143                |
| T1 interfaces.....                       | 24, 36             | overview.....                             | 5                  |
| T3 interfaces.....                       | 50, 62             | path area.....                            | 152                |
| signal transmission.....                 | 153                | payload scrambling                        |                    |
| Single Board Router See SBR              |                    | checklist .....                           | 173                |
| single-mode fiber cable.....             | 104, 137, 195      | configuring.....                          | 175                |
|                                          |                    | conflicts.....                            | 173                |

- described .....173
- levels .....173
- status.....175
- physical link down, table .....140
- ping interface command .....145
- section area.....152
- set cli terminal command.....132
- set clocking internal command.....139
- set encapsulation command.....142
- set fcs 16 command .....183
- set fcs 32 command .....183
- set loopback local command .....138
- set loopback remote command.....147
- set no keepalives command .....143
- set payload-scrambler command.....176
- show configuration interfaces command .....174
- show interfaces
  - command.....128, 130, 131, 139, 174
- show interfaces extensive
  - command.....130, 151, 165
- show interfaces terse command.....128, 144
- statistics
  - checking errors.....145
  - monitoring.....131
  - resetting.....141
- status
  - description table.....128
  - displaying.....128
  - extensive.....130
  - verifying.....139
- transmit clock.....13
- transmitted path trace, checking.....141
- SONET network.....151
  - line area.....152
  - network, figure.....152
  - section area.....152
  - span.....152
  - system hierarchy.....152
- sonet-options statement.....138, 176, 182, 183
- span and SONET line.....152
- span, and SONET line.....152
- specifications for fiber-optic, table.....195
- SSB .....171
- static address resolution protocol.....202
- statistic error
  - Fast Ethernet interfaces.....205
- statistics
  - ATM interfaces, resetting.....109
  - ATM1 interfaces .....89
- channelized interfaces .....227, 255
- Channelized OC12 interfaces.....288
- Channelized OC12 IQ interfaces.....300
- cumulative for SONET interfaces.....132
- errors
  - ATM interfaces .....110
  - SONET interfaces.....145
  - T1 interfaces.....37
  - T3 interfaces.....63
- Fast Ethernet interfaces .....194
  - resetting.....204
- Gigabit Ethernet interfaces .....194
  - resetting.....204
- SONET interfaces, resetting.....141
- T1 interfaces
  - checking .....37
  - monitoring.....26
  - resetting.....34
- T3 interfaces
  - checking.....63
  - monitoring.....52
  - resetting.....60
- status
  - ATM interfaces.....106
  - Channelized DS3 interfaces .....218, 234
  - channelized interfaces.....262, 306
  - Channelized OC12 interfaces .....284
  - Channelized OC12 IQ interfaces .....289
  - controller interface .....294
  - Fast Ethernet interfaces.....188, 201
  - Gigabit Ethernet interfaces .....201
  - Multichannel DS3 interfaces .....250
  - SONET interfaces.....128, 139
  - T1 interfaces.....24, 59
  - T3 interfaces.....50
- status description, table
  - ATM interfaces.....86
  - Fast Ethernet interfaces.....189
  - Gigabit Ethernet interfaces.....189
  - SONET interfaces.....128
  - T1 interfaces.....24
  - T3 interfaces.....50
- status extensive
  - ATM1 interfaces .....87
  - ATM2 IQ interfaces .....93
  - Channelized DS3 interfaces .....222
  - channelized interfaces .....252
  - Channelized OC12 interfaces .....285
  - Channelized OC12 IQ interfaces .....297

|                                            |                   |                                         |                    |
|--------------------------------------------|-------------------|-----------------------------------------|--------------------|
| Fast Ethernet interfaces.....              | 191               | overview .....                          | 4                  |
| Gigabit Ethernet interfaces .....          | 191               | ping command.....                       | 37                 |
| SONET interfaces .....                     | 130               | ping interface command.....             | 37                 |
| T1 interfaces.....                         | 25                | set cli terminal command.....           | 27                 |
| T3 interfaces .....                        | 51                | set clocking internal command.....      | 32                 |
| status for specific interface              |                   | set encapsulation command.....          | 34                 |
| ATM.....                                   | 87                | set loopback local command.....         | 31                 |
| Channelized OC12 .....                     | 285               | set loopback remote command.....        | 39                 |
| Channelized OC12 IQ .....                  | 295               | set no-keepalives command.....          | 35                 |
| Fast Ethernet.....                         | 190               | show interfaces command.....            | 25, 33, 36         |
| Gigabit Ethernet .....                     | 190               | show interfaces extensive command.....  | 38, 41             |
| SONET .....                                | 128               | show interfaces terse command.....      | 24, 36             |
| T1 .....                                   | 25                | statistics                              |                    |
| T3.....                                    | 51                | checking error.....                     | 37                 |
| STE.....                                   | 152               | monitoring.....                         | 26                 |
| steps and commands, overview.....          | 15                | resetting.....                          | 34                 |
| STS                                        |                   | status                                  |                    |
| path signal label assignments, figure..... | 166               | description, table.....                 | 24                 |
| path signal label assignments, table ..... | 166               | displaying all.....                     | 24                 |
| support, technical See technical support   |                   | displaying specific .....               | 25                 |
| supported processes.....                   | 9                 | extensive.....                          | 25                 |
| System and Switch Board See SSB            |                   | supported standards.....                | 4                  |
| system board, location of, table .....     | 171               | transmit clocks.....                    | 13                 |
| System Control Board See SCB               |                   | T1 media alarms, table.....             | 247, 277           |
| system hierarchy, SONET interfaces.....    | 152               | t1-options statement .....              | 233, 241, 261, 272 |
| <b>T</b>                                   |                   | T3 ATM interfaces                       |                    |
| T1 interfaces                              |                   | extensive output.....                   | 112                |
| alarms and errors                          |                   | physical link down.....                 | 107                |
| AIS alarms.....                            | 45                | physical link up.....                   | 107                |
| definitions, table.....                    | 43                | T3 interfaces                           |                    |
| displaying.....                            | 41                | alarms and errors                       |                    |
| yellow alarms .....                        | 45                | AIS alarms.....                         | 70                 |
| circuit problems.....                      | 39                | checklist.....                          | 67                 |
| clear statistics command.....              | 34, 235, 264, 309 | displaying.....                         | 68                 |
| configuring local.....                     | 31                | IDLE signals.....                       | 71                 |
| edit interfaces command.....               | 32, 34, 35        | LOS alarms.....                         | 69                 |
| edit interfaces t1-options command.....    | 31, 39            | yellow alarms.....                      | 71                 |
| encapsulation, configuring .....           | 34                | circuit problems.....                   | 65                 |
| error statistics.....                      | 37                | clocking, setting.....                  | 58                 |
| further investigation.....                 | 25                | edit interfaces command.....            | 58, 60, 61         |
| HDLC, configuring encapsulation.....       | 34                | edit interfaces t3-options command..... | 57, 65             |
| link layer, forcing up.....                | 34                | encapsulation, configuring.....         | 60                 |
| logical interface, status.....             | 36                | error statistics .....                  | 63                 |
| loopback                                   |                   | further investigation .....             | 50                 |
| creating physical.....                     | 31                | HDLC, configuring encapsulation.....    | 60                 |
| loopback, creating physical .....          | 31                | link layer, forcing up.....             | 60                 |
| monitor checklist.....                     | 23                | logical interface, status.....          | 62                 |
| no keepalives, configuring.....            | 35                |                                         |                    |



- loopback
    - configuring local.....57
    - creating physical.....57
    - monitor checklist.....49
    - monitor interface command.....52
    - no keepalives, configuring.....61
    - overview.....4
    - physical link status.....59
    - ping interface command.....63
    - set cli terminal command.....53
    - set clocking internal command.....58
    - set encapsulation command.....60
    - set loopback local command.....57
    - set loopback remote command.....65
    - set no-keepalives command.....61
    - show interfaces command.....51, 59, 62
    - show interfaces extensive command.....63, 68
    - show interfaces terse command.....50, 62
    - statistics
      - checking error.....63
      - monitoring.....52
      - resetting.....60
    - status
      - description, table.....50
      - displaying .....50
      - displaying all.....50
      - displaying specific.....50
      - extensive.....51
      - verifying.....59
    - supported standards.....4
    - transmit clocks.....13
  - t3-options statement
    - .....233, 241, 261, 271, 272, 306, 316
  - TCC, protocol family .....9
  - technical support
    - contacting JTAC.....xxix
  - telcordia/bellcore standard GR-253 CORE.....149
  - TNP, protocol family .....9
  - translational cross-connect TCC, protocol family
    - See TCC, protocol family
  - transmit light level.....195
  - Trivial Network Protocol, protocol family See TNP, protocol family
  - tunnel statement.....9
- U**
  - unit statement.....9
  - upstream or downstream failure, figure .....153
  - upstream, SONET alarms and errors, defining.....153
- V**
  - VCI, configuration
    - ATM1 interfaces.....80
    - ATM2 IQ interfaces.....81
  - virtual channel identifier VCI, configuration See VCI, configuration
  - virtual channel identifier, configuration See VCI, configuration
- Y**
  - yellow alarm bell.....123
  - yellow alarms
    - T1 interfaces .....45
    - T3 interfaces .....71

