



Junos[®] OS

Interfaces Fundamentals Configuration Guide

Release
11.2



Published: 2011-05-20

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® OS Interfaces Fundamentals Configuration Guide

Release 11.2

Copyright © 2011, Juniper Networks, Inc.

All rights reserved.

Revision History

May 2011—R1 Junos OS 11.2

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. The 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

READ THIS END USER LICENSE AGREEMENT ("AGREEMENT") BEFORE DOWNLOADING, INSTALLING, OR USING THE SOFTWARE. BY DOWNLOADING, INSTALLING, OR USING THE SOFTWARE OR OTHERWISE EXPRESSING YOUR AGREEMENT TO THE TERMS CONTAINED HEREIN, YOU (AS CUSTOMER OR IF YOU ARE NOT THE CUSTOMER, AS A REPRESENTATIVE/AGENT AUTHORIZED TO BIND THE CUSTOMER) CONSENT TO BE BOUND BY THIS AGREEMENT. IF YOU DO NOT OR CANNOT AGREE TO THE TERMS CONTAINED HEREIN, THEN (A) DO NOT DOWNLOAD, INSTALL, OR USE THE SOFTWARE, AND (B) YOU MAY CONTACT JUNIPER NETWORKS REGARDING LICENSE TERMS.

1. **The Parties.** The parties to this Agreement are (i) Juniper Networks, Inc. (if the Customer's principal office is located in the Americas) or Juniper Networks (Cayman) Limited (if the Customer's principal office is located outside the Americas) (such applicable entity being referred to herein as "Juniper"), and (ii) the person or organization that originally purchased from Juniper or an authorized Juniper reseller the applicable license(s) for use of the Software ("Customer") (collectively, the "Parties").

2. **The Software.** In this Agreement, "Software" means the program modules and features of the Juniper or Juniper-supplied software, for which Customer has paid the applicable license or support fees to Juniper or an authorized Juniper reseller, or which was embedded by Juniper in equipment which Customer purchased from Juniper or an authorized Juniper reseller. "Software" also includes updates, upgrades and new releases of such software. "Embedded Software" means Software which Juniper has embedded in or loaded onto the Juniper equipment and any updates, upgrades, additions or replacements which are subsequently embedded in or loaded onto the equipment.

3. **License Grant.** Subject to payment of the applicable fees and the limitations and restrictions set forth herein, Juniper grants to Customer a non-exclusive and non-transferable license, without right to sublicense, to use the Software, in executable form only, subject to the following use restrictions:

- a. Customer shall use Embedded Software solely as embedded in, and for execution on, Juniper equipment originally purchased by Customer from Juniper or an authorized Juniper reseller.
- b. Customer shall use the Software on a single hardware chassis having a single processing unit, or as many chassis or processing units for which Customer has paid the applicable license fees; provided, however, with respect to the Steel-Belted Radius or Odyssey Access Client software only, Customer shall use such Software on a single computer containing a single physical random access memory space and containing any number of processors. Use of the Steel-Belted Radius or IMS AAA software on multiple computers or virtual machines (e.g., Solaris zones) requires multiple licenses, regardless of whether such computers or virtualizations are physically contained on a single chassis.
- c. Product purchase documents, paper or electronic user documentation, and/or the particular licenses purchased by Customer may specify limits to Customer's use of the Software. Such limits may restrict use to a maximum number of seats, registered endpoints, concurrent users, sessions, calls, connections, subscribers, clusters, nodes, realms, devices, links, ports or transactions, or require the purchase of separate licenses to use particular features, functionalities, services, applications, operations, or capabilities, or provide throughput, performance, configuration, bandwidth, interface, processing, temporal, or geographical limits. In addition, such limits may restrict the use of the Software to managing certain kinds of networks or require the Software to be used only in conjunction with other specific Software. Customer's use of the Software shall be subject to all such limitations and purchase of all applicable licenses.
- d. For any trial copy of the Software, Customer's right to use the Software expires 30 days after download, installation or use of the Software. Customer may operate the Software after the 30-day trial period only if Customer pays for a license to do so. Customer may not extend or create an additional trial period by re-installing the Software after the 30-day trial period.
- e. The Global Enterprise Edition of the Steel-Belted Radius software may be used by Customer only to manage access to Customer's enterprise network. Specifically, service provider customers are expressly prohibited from using the Global Enterprise Edition of the Steel-Belted Radius software to support any commercial network access services.

The foregoing license is not transferable or assignable by Customer. No license is granted herein to any user who did not originally purchase the applicable license(s) for the Software from Juniper or an authorized Juniper reseller.

4. **Use Prohibitions.** Notwithstanding the foregoing, the license provided herein does not permit the Customer to, and Customer agrees not to and shall not: (a) modify, unbundle, reverse engineer, or create derivative works based on the Software; (b) make unauthorized copies of the Software (except as necessary for backup purposes); (c) rent, sell, transfer, or grant any rights in and to any copy of the Software, in any form, to any third party; (d) remove any proprietary notices, labels, or marks on or in any copy of the Software or any product in which the Software is embedded; (e) distribute any copy of the Software to any third party, including as may be embedded in Juniper equipment sold in the secondhand market; (f) use any 'locked' or key-restricted feature, function, service, application, operation, or capability without first purchasing the applicable license(s) and obtaining a valid key from Juniper, even if such feature, function, service, application, operation, or capability is enabled without a key; (g) distribute any key for the Software provided by Juniper to any third party; (h) use the

Software in any manner that extends or is broader than the uses purchased by Customer from Juniper or an authorized Juniper reseller; (i) use Embedded Software on non-Juniper equipment; (j) use Embedded Software (or make it available for use) on Juniper equipment that the Customer did not originally purchase from Juniper or an authorized Juniper reseller; (k) disclose the results of testing or benchmarking of the Software to any third party without the prior written consent of Juniper; or (l) use the Software in any manner other than as expressly provided herein.

5. **Audit.** Customer shall maintain accurate records as necessary to verify compliance with this Agreement. Upon request by Juniper, Customer shall furnish such records to Juniper and certify its compliance with this Agreement.

6. **Confidentiality.** The Parties agree that aspects of the Software and associated documentation are the confidential property of Juniper. As such, Customer shall exercise all reasonable commercial efforts to maintain the Software and associated documentation in confidence, which at a minimum includes restricting access to the Software to Customer employees and contractors having a need to use the Software for Customer's internal business purposes.

7. **Ownership.** Juniper and Juniper's licensors, respectively, retain ownership of all right, title, and interest (including copyright) in and to the Software, associated documentation, and all copies of the Software. Nothing in this Agreement constitutes a transfer or conveyance of any right, title, or interest in the Software or associated documentation, or a sale of the Software, associated documentation, or copies of the Software.

8. **Warranty, Limitation of Liability, Disclaimer of Warranty.** The warranty applicable to the Software shall be as set forth in the warranty statement that accompanies the Software (the "Warranty Statement"). Nothing in this Agreement shall give rise to any obligation to support the Software. Support services may be purchased separately. Any such support shall be governed by a separate, written support services agreement. TO THE MAXIMUM EXTENT PERMITTED BY LAW, JUNIPER SHALL NOT BE LIABLE FOR ANY LOST PROFITS, LOSS OF DATA, OR COSTS OR PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES, OR FOR ANY SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES ARISING OUT OF THIS AGREEMENT, THE SOFTWARE, OR ANY JUNIPER OR JUNIPER-SUPPLIED SOFTWARE. IN NO EVENT SHALL JUNIPER BE LIABLE FOR DAMAGES ARISING FROM UNAUTHORIZED OR IMPROPER USE OF ANY JUNIPER OR JUNIPER-SUPPLIED SOFTWARE. EXCEPT AS EXPRESSLY PROVIDED IN THE WARRANTY STATEMENT TO THE EXTENT PERMITTED BY LAW, JUNIPER DISCLAIMS ANY AND ALL WARRANTIES IN AND TO THE SOFTWARE (WHETHER EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE), INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NONINFRINGEMENT. IN NO EVENT DOES JUNIPER WARRANT THAT THE SOFTWARE, OR ANY EQUIPMENT OR NETWORK RUNNING THE SOFTWARE, WILL OPERATE WITHOUT ERROR OR INTERRUPTION, OR WILL BE FREE OF VULNERABILITY TO INTRUSION OR ATTACK. In no event shall Juniper's or its suppliers' or licensors' liability to Customer, whether in contract, tort (including negligence), breach of warranty, or otherwise, exceed the price paid by Customer for the Software that gave rise to the claim, or if the Software is embedded in another Juniper product, the price paid by Customer for such other product. Customer acknowledges and agrees that Juniper has set its prices and entered into this Agreement in reliance upon the disclaimers of warranty and the limitations of liability set forth herein, that the same reflect an allocation of risk between the Parties (including the risk that a contract remedy may fail of its essential purpose and cause consequential loss), and that the same form an essential basis of the bargain between the Parties.

9. **Termination.** Any breach of this Agreement or failure by Customer to pay any applicable fees due shall result in automatic termination of the license granted herein. Upon such termination, Customer shall destroy or return to Juniper all copies of the Software and related documentation in Customer's possession or control.

10. **Taxes.** All license fees payable under this agreement are exclusive of tax. Customer shall be responsible for paying Taxes arising from the purchase of the license, or importation or use of the Software. If applicable, valid exemption documentation for each taxing jurisdiction shall be provided to Juniper prior to invoicing, and Customer shall promptly notify Juniper if their exemption is revoked or modified. All payments made by Customer shall be net of any applicable withholding tax. Customer will provide reasonable assistance to Juniper in connection with such withholding taxes by promptly: providing Juniper with valid tax receipts and other required documentation showing Customer's payment of any withholding taxes; completing appropriate applications that would reduce the amount of withholding tax to be paid; and notifying and assisting Juniper in any audit or tax proceeding related to transactions hereunder. Customer shall comply with all applicable tax laws and regulations, and Customer will promptly pay or reimburse Juniper for all costs and damages related to any liability incurred by Juniper as a result of Customer's non-compliance or delay with its responsibilities herein. Customer's obligations under this Section shall survive termination or expiration of this Agreement.

11. **Export.** Customer agrees to comply with all applicable export laws and restrictions and regulations of any United States and any applicable foreign agency or authority, and not to export or re-export the Software or any direct product thereof in violation of any such restrictions, laws or regulations, or without all necessary approvals. Customer shall be liable for any such violations. The version of the Software supplied to Customer may contain encryption or other capabilities restricting Customer's ability to export the Software without an export license.

12. **Commercial Computer Software.** The Software is "commercial computer software" and is provided with restricted rights. Use, duplication, or disclosure by the United States government is subject to restrictions set forth in this Agreement and as provided in DFARS 227.7201 through 227.7202-4, FAR 12.212, FAR 27.405(b)(2), FAR 52.227-19, or FAR 52.227-14 (ALT III) as applicable.

13. **Interface Information.** To the extent required by applicable law, and at Customer's written request, Juniper shall provide Customer with the interface information needed to achieve interoperability between the Software and another independently created program, on payment of applicable fee, if any. Customer shall observe strict obligations of confidentiality with respect to such information and shall use such information in compliance with any applicable terms and conditions upon which Juniper makes such information available.

14. **Third Party Software.** Any licensor of Juniper whose software is embedded in the Software and any supplier of Juniper whose products or technology are embedded in (or services are accessed by) the Software shall be a third party beneficiary with respect to this Agreement, and such licensor or vendor shall have the right to enforce this Agreement in its own name as if it were Juniper. In addition, certain third party software may be provided with the Software and is subject to the accompanying license(s), if any, of its respective owner(s). To the extent portions of the Software are distributed under and subject to open source licenses obligating Juniper to make the source code for such portions publicly available (such as the GNU General Public License ("GPL") or the GNU Library General Public License ("LGPL")), Juniper will make such source code portions (including Juniper modifications, as appropriate) available upon request for a period of up to three years from the date of distribution. Such request can be made in writing to Juniper Networks, Inc., 1194 N. Mathilda Ave., Sunnyvale, CA 94089, ATTN: General Counsel. You may obtain a copy of the GPL at <http://www.gnu.org/licenses/gpl.html>, and a copy of the LGPL at <http://www.gnu.org/licenses/lgpl.html>.

15. **Miscellaneous.** This Agreement shall be governed by the laws of the State of California without reference to its conflicts of laws principles. The provisions of the U.N. Convention for the International Sale of Goods shall not apply to this Agreement. For any disputes arising under this Agreement, the Parties hereby consent to the personal and exclusive jurisdiction of, and venue in, the state and federal courts within Santa Clara County, California. This Agreement constitutes the entire and sole agreement between Juniper and the Customer with respect to the Software, and supersedes all prior and contemporaneous agreements relating to the Software, whether oral or written (including any inconsistent terms contained in a purchase order), except that the terms of a separate written agreement executed by an authorized Juniper representative and Customer shall govern to the extent such terms are inconsistent or conflict with terms contained herein. No modification to this Agreement nor any waiver of any rights hereunder shall be effective unless expressly assented to in writing by the party to be charged. If any portion of this Agreement is held invalid, the Parties agree that such invalidity shall not affect the validity of the remainder of this Agreement. This Agreement and associated documentation has been written in the English language, and the Parties agree that the English version will govern. (For Canada: Les parties aux présentes confirment leur volonté que cette convention de même que tous les documents y compris tout avis qui s'y rattache, soient rédigés en langue anglaise. (Translation: The parties confirm that this Agreement and all related documentation is and will be in the English language)).

Abbreviated Table of Contents

	About This Guide	xxxv
Part 1	Interfaces Fundamentals Configuration Statements Overview	
Chapter 1	Interfaces Fundamentals Configuration Statements and Hierarchy	3
Part 2	Router Interfaces Configuration Concepts	
Chapter 2	Understanding Router Interfaces	27
Chapter 3	Configuring Physical Interface Properties	65
Chapter 4	Configuring Logical Interface Properties	151
Chapter 5	Configuring Protocol Family and Interface Address Properties	177
Chapter 6	Configuring Circuit and Translational Cross-Connects	229
Chapter 7	Tracing Interface Operations	247
Part 3	Configuring Special Router Interfaces	
Chapter 8	Displaying the Internal Ethernet Interface	251
Chapter 9	Configuring Discard Interfaces	255
Chapter 10	Configuring Demultiplexing Interfaces	257
Chapter 11	Configuring the Loopback Interface	267
Part 4	Configuring Serial Interfaces	
Chapter 12	Configuring Serial Interfaces	273
Part 5	Interfaces Fundamentals Configuration Statements	
Chapter 13	Summary of Interfaces Fundamentals Configuration Statements	291
Part 6	Index	
	Index	815
	Index of Statements and Commands	835

Table of Contents

	About This Guide	xxxv
	JUNOS Documentation and Release Notes	xxxv
	Objectives	xxxvi
	Audience	xxxvi
	Supported Routing Platforms	xxxvi
	Using the Indexes	xxxvii
	Using the Examples in This Manual	xxxvii
	Merging a Full Example	xxxvii
	Merging a Snippet	xxxviii
	Documentation Conventions	xxxviii
	Documentation Feedback	xl
	Requesting Technical Support	xl
	Self-Help Online Tools and Resources	xli
	Opening a Case with JTAC	xli
Part 1	Interfaces Fundamentals Configuration Statements Overview	
Chapter 1	Interfaces Fundamentals Configuration Statements and Hierarchy	3
	[edit chassis] Hierarchy Level	3
	[edit interfaces] Hierarchy Level	4
	[edit logical-systems] Hierarchy Level	20
Part 2	Router Interfaces Configuration Concepts	
Chapter 2	Understanding Router Interfaces	27
	Router Interfaces Overview	28
	Types of Interfaces Overview	28
	Permanent Interfaces Overview	29
	Understanding Management Ethernet Interfaces	29
	Understanding Internal Ethernet Interfaces	30
	Understanding Transient Interfaces	32
	Understanding Services Interfaces	33
	Container Interfaces Overview	34
	Understanding Traditional APS Concept	34
	Container Interfaces Concept	35
	APS Support for Container-Based Interfaces	35
	Autocopy of APS Parameters	35
	Interface Encapsulations Overview	36
	Interface Descriptors Overview	47

	Interface Naming Overview	48
	Physical Part of an Interface Name	49
	Logical Part of an Interface Name	53
	Separators in an Interface Name	53
	Channel Part of an Interface Name	54
	Interface Naming for a Routing Matrix Based on a TX Matrix Router	54
	Interface Naming for a Routing Matrix Based on a TX Matrix Plus Router	56
	Chassis Interface Naming	59
	Examples: Interface Naming	59
	Displaying Interface Configurations Overview	61
	Synchronous Ethernet Overview	62
	Interface and Router Clock Sources Overview	63
	Interface and Router Clock Sources Description	63
	Configuring an External Synchronization Interface	64
Chapter 3	Configuring Physical Interface Properties	65
	Physical Interface Configuration Statements Overview	66
	Physical Interfaces Properties Statements List	75
	Interface Ranges	92
	Configuring Interface Ranges	92
	Expanding Interface Range Member and Member Range Statements	96
	Configuration Inheritance for Member Interfaces	97
	Member Interfaces Inheriting Configuration from Configuration Groups	98
	Interfaces Inheriting Common Configuration	99
	Configuring Inheritance Range Priorities	100
	Configuration Expansion Where Interface Range Is Used	100
	Specifying an Aggregated Interface	101
	Specifying a USB Modem Interface on J Series Routers	102
	Specifying OC768-over-OC192 Mode	103
	Adding an Interface Description to the Configuration	104
	Example: Adding an Interface Description to the Configuration	105
	Configuring the Link Characteristics	106
	Configuring the Media MTU	106
	Configuring Interface Encapsulation on Physical Interfaces	116
	Configuring the Encapsulation on a Physical Interface	116
	Encapsulation Capabilities	120
	Example: Configuring the Encapsulation on a Physical Interface	121
	Configuring the PPP Challenge Handshake Authentication Protocol	121
	Assigning an Access Profile to an Interface	122
	Configuring a Default CHAP Secret	123
	Configuring the Local Name	123
	Configuring Passive Mode	123
	Example: Configuring the PPP Challenge Handshake Authentication Protocol	123
	Configuring the PPP Password Authentication Protocol	124
	Configuring the Local Name	126
	Configuring the Local Password	126
	Configuring Passive Mode	126
	Example: Configuring PAP Authentication Protocol	126

Monitoring a PPP Session	128
Tracing Operations of the pppd Process	128
Configuring PPP Address and Control Field Compression	129
Configuring the PPP Protocol Field Compression	130
Configuring the Interface Speed	132
Configuring the Speed of Management Ethernet Interfaces on M Series and T Series Routers	132
Configuring the Speed of Gigabit Ethernet Interfaces on J Series Routers . .	133
Configuring the Speed of Fast Ethernet Interfaces	133
Configuring the Speed of Tri-Rate Ethernet Copper Interfaces	133
Configuring the Speed of SONET/SDH Interfaces	134
Configuring Keepalives	136
Configuring the Clock Source	137
Configuring the Router as a DCE	137
Configuring Receive and Transmit Leaky Bucket Properties	138
Configuring Accounting for the Physical Interface	139
Applying an Accounting Profile to the Physical Interface	140
Example: Applying an Accounting Profile to the Physical Interface . . .	140
Interface Diagnostics	140
Configuring Loopback Testing	141
Interface Diagnostics	143
Starting and Stopping a BERT Test	145
Example: Configuring Bit Error Rate Testing	146
Tracing Operations of an Individual Router Interface	146
Damping Interface Transitions	147
Configuring Multiservice Physical Interface Properties	147
Enabling or Disabling SNMP Notifications on Physical Interfaces	148
Enabling Unidirectional Traffic Flow on Physical Interfaces	148
Disabling a Physical Interface	149
Example: Disabling a Physical Interface	150
Chapter 4	
Configuring Logical Interface Properties	151
Logical Interfaces Configuration Properties Overview	151
Logical Interfaces Configuration Statements	152
Logical Interfaces Statements List	155
Specifying the Logical Interface Number	162
Configuring Logical System Interface Properties	163
Example: Configuring Logical System Interface Properties	164
Adding a Logical Unit Description to the Configuration	164
Configuring a Point-to-Point Connection	164
Configuring a Multipoint Connection	165
Configuring Accounting for the Logical Interface	165
Applying an Accounting Profile to the Logical Interface	166
Example: Applying an Accounting Profile to the Logical Interface	166
Configuring the Interface Bandwidth	166
Enabling or Disabling SNMP Notifications on Logical Interfaces	167
Configuring Interface Encapsulation on Logical Interfaces	168
Configuring the Encapsulation on a Logical Interface	168
Configuring the LCP Configure-Request Maximum Sent	169

Chapter 5

Configuring the NCP Configure-Request Maximum Sent	169
Configuring the PPP Restart Timers	170
Configuring the PPP Clear Loop Detected Timer	170
Configuring Dynamic Profiles for PPP	171
Configuring PPP CHAP Authentication	171
Configuring PPP PAP Authentication	172
Configuring a Default PAP Password	172
Configuring the Local Name	173
Configuring the Local Password	173
Configuring Passive Mode	173
Configuring Dynamic Call Admission Control	174
Example: Configuring Dynamic CAC	175
Disabling a Logical Interface	175
Configuring Protocol Family and Interface Address Properties	177
Protocol Family Configuration and Interface Address Statements	177
Configuring the Protocol Family	180
IPv6 Overview	181
IPv4-to-IPv6 Transition	182
VRRP Properties	182
Configuring the Interface Address	182
Configuring Interface IPv4 Addresses	184
Configuring Interface IPv6 Addresses	184
Configuring the Same IP Address on Multiple Interfaces	185
Configuring ICCP for MC-LAG	187
Configuring IPCP Options	187
Configuring an IP Address for an Interface	188
Negotiating an IP Address Assignment from the Remote End	188
Configuring an Interface to Be Unnumbered	189
Assigning a Destination Profile to the Remote End	189
Configuring an Unnumbered Interface	190
Configuring an Unnumbered Point-to-Point Interface	190
Example: Configuring an Unnumbered Point-to-Point Interface	191
Configuring an Unnumbered Ethernet or Demux Interface	191
Configuring a Preferred Source Address for Unnumbered Ethernet or Demux Interfaces	192
Configuring Static Routes on Unnumbered Ethernet Interfaces	193
Restrictions for Configuring Unnumbered Ethernet Interfaces	193
Example: Configuring an Unnumbered Ethernet Interface	194
Example: Configuring the Preferred Source Address for an Unnumbered Ethernet Interface	194
Example: Configuring an Unnumbered Ethernet Interface as the Next Hop for a Static Route	195
Setting the Protocol MTU	195
Disabling the Removal of Address and Control Bytes	196
Disabling the Transmission of Redirect Messages on an Interface	196
Configuring Default, Primary, and Preferred Addresses and Interfaces	197
Configuring the Primary Interface for the Router	197
Configuring the Primary Address for an Interface	198

Configuring the Preferred Address for an Interface	198
Applying Policers	199
Applying Aggregate Policers	200
Example: Applying Aggregate Policers	201
Applying Hierarchical Policers on Enhanced Intelligent Queuing PICs	202
Hierarchical Policer Overview	203
Hierarchical Policing Characteristics	203
Configuring Hierarchical Policers	204
Configuring a Single-Rate Two-Color Policer	205
Configuring a Single-Rate Tricolor Policer	205
Configuring a Two-Rate Tricolor Marker Policer	206
Applying a Filter to an Interface	208
Defining Interface Groups in Firewall Filters	209
Filter-Based Forwarding on the Output Interface	210
Example: Applying a Filter to an Interface	210
Configuring Unicast RPF	212
Configuring Unicast RPF Strict Mode	213
Configuring Unicast RPF Loose Mode	214
Unicast RPF and Default Routes	214
Unicast RPF Behavior with a Default Route	215
Unicast RPF Behavior Without a Default Route	215
Unicast RPF with Routing Asymmetry	216
Configuring Unicast RPF on a VPN	216
Example: Configuring Unicast RPF on a VPN	216
Example: Configuring Unicast RPF	217
Enabling Source Class and Destination Class Usage	218
Examples: Enabling Source Class and Destination Class Usage	221
Enabling Targeted Broadcast	225
Understanding Targeted Broadcast	226
Configuring Targeted Broadcast	227
Example: Configuring Targeted Broadcast	228
Example: Configuring Targeted Broadcast to the Egress Interface and to the Routing Engine	228
Example: Configuring Targeted Broadcast to Only the Egress Interface	228
Chapter 6	
 Configuring Circuit and Translational Cross-Connects	229
Circuit and Translational Cross-Connects Overview	229
Defining the Encapsulation for Switching Cross-Connects	231
Configuring PPP or Cisco HDLC Circuits	231
Configuring ATM Circuits	232
Configuring Frame Relay Circuits	232
Configuring Ethernet CCC Circuits	233
Configuring Ethernet VLAN Circuits	234
Defining the Connection for Switching Cross-Connects	234
Configuring MPLS for Switching Cross-Connects	235
Configuring IS-IS or MPLS Traffic for TCC Interfaces	235

	Configuring ATM-to-Ethernet Interworking	236
	Enabling ATM-to-Ethernet Interworking	237
	Configuring the Ethernet Interface	237
	Configuring Ethernet Encapsulation	237
	Configuring the Outer VLAN Identifier	237
	Configuring the Inner VLAN Identifier Range	237
	Configuring the Physical Interface VPI	238
	Configuring the ATM Logical Interface	238
	Configuring the Protocol Family	238
	Configuring the Logical Interface VPI	239
	Configuring the Logical Interface VCI	239
	Examples: Configuring Switching Cross-Connects	239
	Example: Configuring a CCC over Frame Relay Encapsulated Interface	239
	Example: Configuring a TCC	240
	Example: Configuring CCC over Aggregated Ethernet	242
	Example: Configuring a Remote LSP CCC over Aggregated Ethernet	243
	Example: Configuring ATM-to-Ethernet Interworking	245
Chapter 7	Tracing Interface Operations	247
	Tracing Interface Operations Overview	247
	Tracing Operations of an Individual Router or Switch Interface	247
	Tracing Operations of the Interface Process	248
Part 3	Configuring Special Router Interfaces	
Chapter 8	Displaying the Internal Ethernet Interface	251
	Internal Ethernet Interface Overview	251
	Displaying the Internal Ethernet Interface for M Series, MX Series, and Most T Series Routers	252
	Displaying Internal Ethernet Interfaces for a Routing Matrix with a TX Matrix Plus Router	252
Chapter 9	Configuring Discard Interfaces	255
	Discard Interfaces Overview	255
	Example: Discard Interface	256
Chapter 10	Configuring Demultiplexing Interfaces	257
	Demultiplexing Interface Overview	257
	Configuring an IP Demultiplexing Interface	258
	Configuring an IP Demux Underlying Interface	259
	Configuring a VLAN Demultiplexing Interface	260
	Configuring a VLAN Demux Underlying Interface	261
	Specifying the Demux Underlying Interface	261
	Configuring IP Demux Prefixes	262
	Configuring MAC Address Validation on Static Demux Interfaces	263
	Example: Configuring a Demux Interface	263
Chapter 11	Configuring the Loopback Interface	267
	Configuring the Loopback Interface	267
	Example: Configuring the Loopback Interface	268

Part 4	Configuring Serial Interfaces	
Chapter 12	Configuring Serial Interfaces	273
	Serial Interfaces Overview	273
	Example: Physical Interface Configuration Statements for Serial Interfaces . . .	274
	Configuring the Serial Line Protocol	275
	Serial Interface Default Settings	276
	EIA-530 Interface Default Settings	276
	V.35 Interface Default Settings	276
	X.21 Interface Default Settings	277
	Invalid Serial Interface Statements	277
	Invalid EIA-530 Interface Statements	277
	Invalid V.35 interface Statements	278
	Invalid X.21 Interface Statements	278
	Configuring the Serial Clocking Mode	279
	Inverting the Serial Interface Transmit Clock	280
	Configuring the DTE Clock Rate	280
	Configuring the Serial Idle Cycle Flag	281
	Configuring the Serial Signal Handling	281
	Configuring the Serial DTR Circuit	284
	Configuring Serial Signal Polarities	284
	Configuring Serial Loopback Capability	285
	Example: Configuring Serial Loopback Capability	286
	Configuring Serial Line Encoding	287
Part 5	Interfaces Fundamentals Configuration Statements	
Chapter 13	Summary of Interfaces Fundamentals Configuration Statements	291
	802.3ad	291
	accept	292
	accept-source-mac	293
	access-concentrator	294
	access-profile	295
	accounting	296
	accounting-profile	296
	acfc	297
	acknowledge-retries	298
	acknowledge-timer	299
	action	300
	action (OAM)	300
	action (Policer)	300
	action-profile	301
	action-profile (Applying to CFM)	301
	action-profile (Defining for CFM)	302
	action-profile (Defining for LFM)	303
	action-red-differential-delay	304
	activation-delay	304
	activation-priority	305
	address	306

advertise-interval	307
age	308
agent-specifier	309
aggregate	311
aggregate (Gigabit Ethernet CoS Policer)	311
aggregate (Hierarchical Policer)	312
aggregate (SONET/SDH)	312
aggregate-ports	313
aggregated-ether-options	314
aggregated-sonet-options	315
alarm	316
allow-any-vci	316
allow-fragmentation	317
allow-remote-loopback	317
annex	318
apply-action-profile	318
aps	319
arp	320
asynchronous-notification	321
atm-encapsulation	321
atm-options	322
atm-scheduler-map	323
authentication	324
authentication-key	325
authentication-profile-name	325
authenticator	326
auto-configure	327
auto-discovery	328
auto-negotiation	329
auto-reconnect	330
backup-destination	330
backup-interface	331
backup-options	331
bandwidth	332
bandwidth-limit	333
bandwidth-limit (Hierarchical Policer)	333
bandwidth-limit (Policer for Gigabit Ethernet Interfaces)	334
bchannel-allocation	334
bearer-bandwidth-limit	335
bert-algorithm	336
bert-error-rate	338
bert-period	339
bridge-domain	340
broadcast	341
buildout	342
buildout (E3 or T3 over ATM Interfaces)	342
buildout (T1 Interfaces)	343
bundle	344

burst-size-limit	345
burst-size-limit (Hierarchical Policer)	345
burst-size-limit (Policer for Gigabit Ethernet Interfaces)	345
byte-encoding	346
bytes	347
calculation-weight	348
callback	349
callback-wait-period	350
caller	351
calling-number	352
cbit-parity	352
cbr	353
cell-bundle-size	354
chap	355
chap-secret	356
circuit-type	356
cisco-interoperability	357
classifier	357
clear-dont-fragment-bit	358
client	358
clock-rate	359
clocking	360
clocking-mode	361
compatibility-mode	362
compression	363
compression (PPP Properties)	363
compression (Voice Services)	364
compression-device	364
connections	365
connectivity-fault-management	366
container-devices	368
container-list	368
container-options	369
container-type	369
continuity-check	370
control-channel	371
control-polarity	371
control-signal	372
copy-tos-to-outer-ip-header	372
core-dump	373
crc-major-alarm-threshold	373
crc-minor-alarm-threshold	374
cts	374
cts-polarity	375
current	375
cycle-time	376
data-channel	376
data-input	377
data-tlv-size	378

dcd	379
dcd-polarity	379
dce	380
dce-options	380
deactivation-delay	381
default-actions	381
default-chap-secret	382
default-pap-password	382
delay (PPPoE Service Name Tables)	383
delay	384
delay-variation	385
delegate-server-processing	385
delimiter	386
demux-destination	387
demux-destination (Underlying Interface)	387
demux-destination (Demux Interface)	388
demux-options	388
demux-source	389
demux-source (Demux Interface)	389
demux-source (Underlying Interface)	390
demux0 (Static Interface)	391
description	392
destination	393
destination (IPCP)	393
destination (Routing Instance)	394
destination (Tunnels)	394
destination-class-usage	395
destination-profile	395
dial-options	396
dial-string	396
dialer	397
dialer-options	398
dialin	399
direction	399
disable	400
disable (Interface)	400
disable (Link Protection)	401
disable-mlppp-inner-ppp-pfc	401
dlci	402
do-not-fragment	403
domain-name	404
dot1x	405
down-count	406
drop (PPPoE Service Name Tables)	407
drop-timeout	407
ds0-options	408
dsl-options	408
dsr	409
dsr-polarity	409

dte-options	410
dtr	411
dtr-circuit	412
dtr-polarity	412
dump-on-flow-control	413
dynamic-call-admission-control	414
dynamic-profile	415
dynamic-profile (PPPoE Service Name Tables)	415
dynamic-profile (Stacked VLAN)	416
dynamic-profile (VLAN)	416
e1-options	417
e3-options	418
east-interface	419
encapsulation	420
encapsulation (Container Interface)	420
encapsulation (Logical Interface)	421
encapsulation (Physical Interface)	424
encoding	427
epd-threshold	428
epd-threshold (Logical Interface)	428
epd-threshold (Physical Interface)	429
es-options	429
ethernet (Protocols OAM)	430
ethernet-policer-profile	433
ethernet-ring	434
ethernet-switch-profile	435
eui-64	436
evcs	437
event (LFM)	438
event-thresholds	438
f-max-period	439
facility-override	439
failover-delay	440
family	441
fastether-options	445
fcs	446
feac-loop-respond	447
filter	448
flexible-vlan-tagging	449
flow-control	449
flow-control-options	450
force	450
forward-and-send-to-re	451
forward-only	451
forwarding-class	452
forwarding-class (ATM2 IQ Scheduler Maps)	452
forwarding-class (Gigabit Ethernet IQ Classifier)	453
forwarding-mode (100-Gigabit Ethernet)	453
fragment-threshold	454

frame-error	455
frame-period	456
frame-period-summary	457
framing	458
framing (E1, E3, and T1 Interfaces)	459
framing (10-Gigabit Ethernet Interfaces)	460
framing (SONET and SDH Interfaces)	460
gigether-options	461
gratuitous-arp-reply	462
guard-interval	463
hardware-assisted-timestamping	463
hello-timer	464
hierarchical-policer	465
hierarchical-schedulers	466
high-plp-max-threshold	466
high-plp-threshold	467
hold-interval	468
hold-interval (OAM)	468
hold-interval (Protection Group)	468
hold-time	469
hold-time (APS)	469
hold-time (Physical Interface)	470
hold-time (SONET/SDH Defect Triggers)	471
host	472
idle-cycle-flag	473
idle-timeout	474
ieee802.1p	474
if-exceeding	475
igmp-snooping	476
ignore	477
ignore-all	477
ignore-l3-incompletes	478
ilmi	478
ima-group-options	479
ima-link-options	480
inactivity-timeout	481
incoming-called-number	481
incoming-map	482
indication	483
indication-polarity	483
ingress-rate-limit	484
init-command-string	485
initial-route-check	486
inner-tag-protocol-id	487
inner-vlan-id	488
inner-vlan-id-range	489
input	489
input-list	490
input-policer	490

input-priority-map	491
input-three-color	491
input-vlan-map	492
input-vlan-map (Aggregated Ethernet)	492
input-vlan-map (Gigabit Ethernet IQ and 10-Gigabit Ethernet SFPP)	493
instance	493
interface	494
interface (Hierarchical CoS Schedulers)	494
interface (IEEE 802.1x)	495
interface (IEEE 802.1ag OAM Connectivity-Fault Management)	496
interface (OAM Link-Fault Management)	497
interface-down	498
interface-mode	499
interface-name	500
interface-range	501
interface-set	503
interface-set (Ethernet Interfaces)	503
interface-set (IP Demux Interfaces)	504
interface-status-tlv	504
interface-switch	505
interface-type	506
interfaces	507
interleave-fragments	507
interval	508
inverse-arp	509
invert-data	510
ipsec-sa	511
isdn-options	512
iteration-count	513
iteration-period	513
keep-address-and-control	514
keepalives	515
key	516
l2tp-interface-id	516
lACP	517
lACP (802.3ad)	517
lACP (Aggregated Ethernet)	518
layer2-policer	519
lcp-max-conf-req	520
lcp-restart-timer	520
level	521
line-encoding	522
line-protocol	523
line-rate	523
linear-red-profile	524
linear-red-profiles	525
link-adjacency-loss	525
link-discovery	526
link-down	526

link-event-rate	527
link-fault-management	528
link-layer-overhead	529
link-mode	530
link-protection	531
link-speed	532
link-speed (Aggregated Ethernet)	532
link-speed (Aggregated SONET/SDH)	533
linktrace	534
lmi	535
lmi (Frame Relay)	536
lmi (Ethernet OAM)	538
lmi-type	539
load-interval	540
load-threshold	541
local-name	542
local-password	543
lockout	543
log-prefix	544
logical-interface-fpc-redundancy (Aggregated Ethernet Subscriber Interfaces)	544
logical-interface-policer	545
logical-systems	545
long-buildout	546
loop-timing	547
loopback	548
loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3)	549
loopback (Aggregated Ethernet, Fast Ethernet, and Gigabit Ethernet) . . .	550
loopback (Serial)	551
loopback-clear-timer	552
loss-priority	552
loss-threshold	553
low-plp-max-threshold	553
low-plp-threshold	554
lowest-priority-defect	555
lsq-failure-options	556
mac	556
mac-address	557
mac-address (Accept Source Mac)	557
mac-address (VLAN and Stacked VLAN Interfaces)	557
mac-learn-enable	558
mac-validate	559
maintenance-association	560
maintenance-domain	561
master-only	562
maximum	562
maximum-contexts	563
maximum-requests	563
maximum-vcs	564

max-sessions (PPPoE Service Name Tables)	565
mc-ae	566
measurement-type	567
member-interface-speed	567
member-interface-type	568
mep	569
minimum-links	570
mip-half-function	571
mlfr-uni-nni-bundle-options	572
mode	573
modem-options	573
monitor-session	574
mpls	574
mrru	575
mtu	576
multi-chassis-protection	577
multicast-dlci	578
multicast-only	578
multicast-router-interface	579
multicast-statistics	579
multicast-vci	580
multilink-max-classes	581
multipoint	581
multipoint-destination	582
multiservice-options	583
n391	584
n392	585
n393	586
name-format	587
native-vlan-id	588
ncp-max-conf-req	589
ncp-restart-timer	589
negotiate-address	590
negotiation-options	590
neighbor	591
no-allow-link-events	591
no-auto-mdix	592
no-gratuitous-arp-request	592
no-keepalives	593
no-partition	594
no-pre-classifier	595
no-redirects	595
no-termination-request	596
node-id	596
non-revertive	597
oam	598
oam-liveness	600
oam-period	601
oc-slice	602

open-timeout	602
operating-mode	603
optics-options	604
option-82	605
otn-options	606
output	608
output-list	609
output-policer	609
output-priority-map	610
output-three-color	610
output-vlan-map	611
output-vlan-map (Aggregated Ethernet)	611
output-vlan-map (Gigabit Ethernet IQ and 10-Gigabit Ethernet with SFPP)	612
overflow	613
overflow (Receive Bucket)	613
overflow (Transmit Bucket)	613
override	614
pado-advertise	614
paired-group	615
pap	616
pap-password	617
partition	618
passive	619
passive (CHAP)	619
passive (PAP)	620
passive-monitor-mode	620
password	621
path-database-size	621
path-trace	622
payload-scrambler	623
payload-size	624
pdu-interval	624
pdu-threshold	625
peer	626
peer-unit	627
per-unit-scheduler	628
performance-monitoring	629
periodic	630
pfc	630
pic-type	631
plp-to-clp	631
plp1	632
point-to-point	633
policer	634
policer (CFM Firewall)	634
policer (CFM Global)	635
policer (CFM Session)	636
policer (CoS)	637

policer (Interface)	638
policer (MAC)	639
pool	640
pop	641
pop-all-labels	642
pop-pop	643
pop-swap	643
port	644
port-priority	644
port-status-tlv	645
post-service-filter	645
ppp-options	646
pppoe-options	647
pppoe-underlying-options (Static and Dynamic Subscribers)	648
preferred	649
preferred-source-address	650
premium	651
premium (Hierarchical Policer)	651
premium (Output Priority Map)	652
premium (Policer)	652
preserve-interface	653
primary	654
primary (Address on Interface)	654
primary (AS PIC or Multiservices PIC Interfaces)	654
priority	655
priority (OAM Connectivity-Fault Management)	655
priority (Schedulers)	656
priority	656
promiscuous-mode	657
protect-circuit	657
protection-group	658
protocol-down	659
protocols	659
proxy	660
proxy-arp	661
push	662
push-push	662
queue-depth	663
queue-length	664
queues	664
quiet-period	665
radius-realm	665
ranges	666
ranges (Dynamic Stacked VLAN)	666
ranges (Dynamic VLAN)	667
rate	667
rate	668
reassemble-packets	668
reauthentication	669

rebalance-periodic (Aggregated Ethernet Subscriber Interfaces)	669
receive-bucket	670
receive-options-packets	670
receive-ttl-exceeded	671
red-differential-delay	671
redial-delay	672
redundancy-options	673
remote	674
remote-loopback	674
remote-loopback-respond	675
remote-mep	676
request	676
required-depth	677
restore-interval	678
retries	678
revert-time	679
revertive	679
rfc-2615	680
ring-protection-link-end	680
ring-protection-link-owner	681
routing-instance	681
routing-instance (PPPoE Service Name Tables)	682
rpf-check (interfaces)	683
rtp	684
rts	684
rts-polarity	685
rtvbr	686
sa-multicast (100-Gigabit Ethernet)	687
sampling	687
satop-options	688
scheduler-maps	689
schedulers	689
secondary	690
send-critical-event	690
serial-options	691
server	692
server-timeout	692
service	693
service (Logical Interfaces)	693
service (PPPoE)	694
service-domain	695
service-filter	696
service-name	696
service-name-table	697
service-name-tables	698
service-set	699
services	700
services-options	701
session-limit	702

shaping	703
shdsl-options	704
short-name-format	705
short-sequence	705
sla-iterator-profile	706
sla-iterator-profiles	707
snext	708
snr-margin	709
sonet-options	710
source	712
source-address-filter	713
source-class-usage	714
source-filtering	715
speed	716
speed (Ethernet)	716
speed (MX Series DPC)	717
speed (SONET/SDH)	718
spid1	718
spid2	719
stacked-vlan-ranges	720
stacked-vlan-tagging	721
start-end-flag	722
static-interface	723
static-tei-val	724
supplicant	724
supplicant-timeout	725
swap	725
swap-push	726
swap-swap	726
switch-options	727
switch-port	728
switch-type	729
switching-mode	730
symbol-period	731
syslog	732
syslog (Interfaces)	732
syslog (Monitoring)	733
syslog (OAM Action)	733
system-priority	734
t1-options	735
t310	736
t391	736
t392	737
t3-options	738
tag-protocol-id	739
tag-protocol-id (TPIDs Expected to Be Sent or Received)	739
tag-protocol-id (TPID to Rewrite)	740
targeted-broadcast	741
targeted-distribution (Demux Interfaces over Aggregated Ethernet)	741

tei-option	742
terminate (PPPoE Service Name Tables)	742
then	743
threshold	743
timeslots	744
tm	745
tm-polarity	745
traceoptions	746
traceoptions (ICCP)	747
traceoptions (Individual Interfaces)	748
traceoptions (Interface Process)	750
traceoptions (LACP)	752
traceoptions (PPP Process)	754
traceoptions (PPPoE)	757
translate-discard-eligible	759
translate-fecn-and-becn	759
transmit-bucket	760
transmit-clock	760
transmit-period	761
transmit-weight	762
transmit-weight (ATM2 IQ CoS Forwarding Class)	762
transmit-weight (ATM2 IQ Virtual Circuit)	763
traps	763
trigger	764
trigger-link-failure	765
trunk-bandwidth	765
trunk-id	766
ttl	766
tunnel	767
underlying-interface	768
unframed	769
unidirectional	769
unit	770
unnumbered-address	777
unnumbered-address (Demux)	777
unnumbered-address (Ethernet)	778
unnumbered-address (PPP)	779
up-count	780
user-prefix	781
username-include	782
vbr	783
vc-cos-mode	784
vci	785
vci-range	786
virtual-switch	786
vlan-id	787
vlan-id (Logical Port in Bridge Domain)	787
vlan-id (Outer VLAN ID)	788
vlan-id (VLAN ID to Be Bound to a Logical Interface)	788

vlan-id (VLAN ID to Rewrite)	789
vlan-id-list	790
vlan-id-list (Ethernet VLAN Circuit)	791
vlan-id-list (Interface in Bridge Domain)	792
vlan-id-range	793
vlan-ranges	794
vlan-rewrite	795
vlan-rule (100-Gigabit Ethernet)	795
vlan-steering (100-Gigabit Ethernet)	796
vlan-tagging	797
vlan-tags	798
vlan-tags (Dual-Tagged Logical Interface)	799
vlan-tags (Stacked VLAN Tags)	801
vlan-tags-outer	802
vlan-vci-tagging	802
vpi	803
vpi (ATM CCC Cell-Relay Promiscuous Mode)	803
vpi (Define Virtual Path)	804
vpi (Logical Interface and Interworking)	805
vtmapping	805
warning	806
watch-list	806
wavelength	807
west-interface	810
working-circuit	811
yellow-differential-delay	811
z0-increment	812

Part 6

Index

Index	815
Index of Statements and Commands	835

List of Figures

Part 2	Router Interfaces Configuration Concepts	
Chapter 2	Understanding Router Interfaces	27
	Figure 1: APS Interface	34
	Figure 2: Container Interface	35
	Figure 3: Routing Matrix	55
	Figure 4: Routing Matrix Based on a TX Matrix Plus Router	57
	Figure 5: Interface Slot, PIC, and Port Locations	60
	Figure 6: Clock Sources	64
Chapter 5	Configuring Protocol Family and Interface Address Properties	177
	Figure 7: Hierarchical Policer	203
	Figure 8: Unicast RPF with Routing Asymmetry	216
	Figure 9: Prefix Accounting with Source and Destination Classes	219
Chapter 6	Configuring Circuit and Translational Cross-Connects	229
	Figure 10: Layer 2 Switching Circuit Cross-Connect	230
	Figure 11: Example Topology of a Switching Circuit Cross-Connect with Frame Relay CCC Encapsulation	239
	Figure 12: Layer 2.5 Switching Translational Cross-Connect	240
	Figure 13: Interface-to-Interface Circuit Cross-Connect over Aggregated Ethernet Interfaces	242
	Figure 14: Remote Interface-LSP-Interface Circuit Cross-Connect over Aggregated Ethernet Interfaces	243
	Figure 15: ATM-to-Ethernet Interworking	245
Part 4	Configuring Serial Interfaces	
Chapter 12	Configuring Serial Interfaces	273
	Figure 16: Serial Interface Clocking Mode	279
	Figure 17: Serial Interface LIU Loopback	285
	Figure 18: Serial Interface Local Loopback	286

List of Tables

	About This Guide	xxxv
	Table 1: Notice Icons	xxxix
	Table 2: Text and Syntax Conventions	xxxix
Part 2	Router Interfaces Configuration Concepts	
Chapter 2	Understanding Router Interfaces	27
	Table 3: Encapsulation Support by Interface Type	36
	Table 4: FPC Numbering for T640 Routers in a Routing Matrix	56
	Table 5: One-to-One FPC Numbering for T640 Routers in a Routing Matrix	56
	Table 6: FPC Numbering for T1600 Routers in a Routing Matrix	58
	Table 7: One-to-One FPC Numbering for T1600 Routers in a Routing Matrix	58
Chapter 3	Configuring Physical Interface Properties	65
	Table 8: Statements for Physical Interface Properties	75
	Table 9: Media MTU Sizes by Interface Type for M5, M7i with CFEB, M10, M10i with CFEB, M20, and M40 Routers	107
	Table 10: Media MTU Sizes by Interface Type for M40e Routers	107
	Table 11: Media MTU Sizes by Interface Type for M160 Routers	108
	Table 12: Media MTU Sizes by Interface Type for M7i with CFEB-E, M10i with CFEB-E, M320 and M120 Routers	109
	Table 13: Media MTU Sizes by Interface Type for MX Series Routers	110
	Table 14: Media MTU Sizes by Interface Type for T320 Routers	110
	Table 15: Media MTU Sizes by Interface Type for T640 Platforms	110
	Table 16: Media MTU Sizes by Interface Type for J2300 Platforms	111
	Table 17: Media MTU Sizes by Interface Type for J4300 and J6300 Platforms	111
	Table 18: Media MTU Sizes by Interface Type for J4350 and J6350 Platforms	112
	Table 19: Media MTU Sizes by Interface Type for EX Series Switches	113
	Table 20: Encapsulation Overhead by Encapsulation Type	114
	Table 21: Type 1 PIC Mode Combinations	134
	Table 22: Type 2 PIC Mode Combinations	135
	Table 23: Loopback Modes by Interface Type	142
	Table 24: BERT Capabilities by Interface Type	145
Chapter 4	Configuring Logical Interface Properties	151
	Table 25: Statements for Logical Interface Properties	155
Part 4	Configuring Serial Interfaces	
Chapter 12	Configuring Serial Interfaces	273
	Table 26: Signal Handling by Serial Interface Type	281

About This Guide

This preface provides the following guidelines for using the *Junos[®] OS Interfaces Fundamentals Configuration Guide*:

- JUNOS Documentation and Release Notes on page xxxv
- Objectives on page xxxvi
- Audience on page xxxvi
- Supported Routing Platforms on page xxxvi
- Using the Indexes on page xxxvii
- Using the Examples in This Manual on page xxxvii
- Documentation Conventions on page xxxviii
- Documentation Feedback on page xl
- Requesting Technical Support on page xl

JUNOS Documentation and Release Notes

For a list of related JUNOS documentation, see
<http://www.juniper.net/techpubs/software/junos/>.

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

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

Juniper Networks supports a technical book program to publish books by Juniper Networks engineers and subject matter experts with book publishers around the world. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration using the Junos operating system (Junos OS) and Juniper Networks devices. In addition, the Juniper Networks Technical Library, published in conjunction with O'Reilly Media, explores improving network security, reliability, and availability using Junos OS configuration techniques. All the books are for sale at technical bookstores and book outlets around the world. The current list can be viewed at <http://www.juniper.net/books>.

Objectives

This guide provides an overview of the network interfaces features of the Junos OS and describes how to configure these properties on the routing platform.



NOTE: For additional information about the Junos OS—either corrections to or information that might have been omitted from this guide—see the software release notes at <http://www.juniper.net/>.

Audience

This guide is designed for network administrators who are configuring and monitoring a Juniper Networks M Series, MX Series, T Series, EX Series, or J Series router or switch.

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

Personnel operating the equipment must be trained and competent; must not conduct themselves in a careless, willfully negligent, or hostile manner; and must abide by the instructions provided by the documentation.

Supported Routing Platforms

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

- J Series
- M Series

- MX Series
- T Series

Using the Indexes

This reference contains two indexes: a complete index that includes topic entries, and an index of statements and commands only.

In the index of statements and commands, an entry refers to a statement summary section only. In the complete index, the entry for a configuration statement or command contains at least two parts:

- The primary entry refers to the statement summary section.
- The secondary entry, *usage guidelines*, refers to the section in a configuration guidelines chapter that describes how to use the statement or command.

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. 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](#).

Documentation Conventions

Table 1 on page xxxix 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.

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

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the configure command: <code>user@host> configure</code>
Fixed-width text like this	Represents output that appears on the terminal screen.	<code>user@host> show chassis alarms</code> <code>No alarms currently active</code>
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces important new terms. Identifies book names. Identifies RFC and Internet draft titles. 	<ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>Junos OS System Basics Configuration Guide</i> RFC 1997, <i>BGP Communities Attribute</i>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# set system domain-name <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; interface names; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level. The console port is labeled CONSOLE.
< > (angle brackets)	Enclose optional keywords or variables.	<code>stub <default-metric metric>;</code>

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

Convention	Description	Examples
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	broadcast multicast <i>(string1 string2 string3)</i>
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	rsvp { # Required for dynamic MPLS only
[] (square brackets)	Enclose a variable for which you can substitute one or more values.	community name members [community-ids]
Indentation and braces ({ })	Identify a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
J-Web GUI Conventions		
Bold text like this	Represents J-Web graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> In the Logical Interfaces box, select All Interfaces. To cancel the configuration, click Cancel.
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select Protocols>Ospf .

Documentation Feedback

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

Interfaces Fundamentals Configuration Statements Overview

- Interfaces Fundamentals Configuration Statements and Hierarchy on page 3

CHAPTER 1

Interfaces Fundamentals Configuration Statements and Hierarchy

The following interfaces hierarchy listings show the complete configuration statement hierarchy for the indicated hierarchy levels, listing all possible configuration statements within the indicated hierarchy levels, and showing their level in the configuration hierarchy. When you are configuring the Junos OS, your current hierarchy level is shown in the banner on the line preceding the **user@host#** prompt.

This section contains the following topics:

- [edit chassis] Hierarchy Level on page 3
- [edit interfaces] Hierarchy Level on page 4
- [edit logical-systems] Hierarchy Level on page 20

[edit chassis] Hierarchy Level

```
chassis {
  aggregated-devices {
    ethernet {
      device-count number;
    }
    sonet {
      device-count number;
    }
  }
  channel-group number {
    ethernet {
      device-count number;
    }
    fpc slot-number {
      pic pic-number {
        adaptive-services {
          service-package (layer-2 | layer-3);
        }
        aggregate-ports;
        atm-cell-relay-accumulation;
        atm-l2circuit-mode (aal5 | cell | trunk trunk);
        cel {
          el link-number {
```

```
        channel-group group-number;
        timeslots time-slot-range;
    }
}
ct1 {
    t1 link-number {
        channel-group group-number;
        timeslots time-slot-range;
    }
}
ct3 {
    port port-number {
        t1 link-number {
            channel-group group-number;
            timeslots time-slot-range;
        }
    }
    framing sdh;
}
max-queues-per-interface number;
mlfr-uni-nni-bundles num-intf;
no-concatenate;
shdsl {
    pic-mode (1-port-atm | 2-port-atm);
}
vtmapping (klm | itu-t);
}
}
fpc slot-number {
    pic pic-number {
        egress-policer-overhead bytes;
        ingress-policer-overhead bytes;
    }
}
}
```

[edit interfaces] Hierarchy Level

The statements at the [edit interfaces *interface-name* unit *logical-unit-number*] hierarchy level can also be configured at the [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*] hierarchy level.



.....

NOTE: The accounting-profile statement is an exception to this rule. The accounting-profile statement can be configured at the [edit interfaces *interface-name* unit *logical-unit-number*] hierarchy level, but it cannot be configured at the [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*] hierarchy level.

.....

```
interfaces {
    traceoptions {
        file filename <files number> <match regular-expression> <size size> <world-readable |
        no-world-readable>;
    }
}
```

```

    flag flag <disable>;
}
interface-name {
    accounting-profile name;
    aggregated-ether-options {
        (flow-control | no-flow-control);
        lacp {
            (active | passive);
            link-protection {
                disable;
                (revertive | non-revertive);
                periodic interval;
                system-priority priority;
            }
        }
        link-protection;
        link-speed speed;
        (loopback | no-loopback);
        mc-ae {
            chassis-id chassis-id;
            mc-ae-id mc-ae-id;
            mode (active-active | active-standby);
            redundancy-group group-id;
            status-control (active | standby);
        }
        minimum-links number;
        source-address-filter {
            mac-address;
        }
        (source-filtering | no-source-filtering);
    }
    aggregated-sonet-options {
        link-speed speed | mixed;
        minimum-links number;
    }
    atm-options {
        cell-bundle-size cells;
        ilmi;
        linear-red-profiles profile-name {
            high-plp-max-threshold percent;
            low-plp-max-threshold percent;
            queue-depth cells high-plp-threshold percent low-plp-threshold percent;
        }
        mpls {
            pop-all-labels {
                required-depth number;
            }
        }
        pic-type (atm1 | atm2);
        plp-to-clp;
        promiscuous-mode {
            vpi vpi-identifier;
        }
        scheduler-maps map-name {
            forwarding-class class-name {
                epd-threshold cells plp1 cells;
                linear-red-profile profile-name;
            }
        }
    }
}

```

```
        priority (high | low);
        transmit-weight (cells number | percent number);
    }
    vc-cos-mode (alternate | strict);
}
use-null-cw;
vpi vpi-identifier {
    maximum-vcs maximum-vcs;
    oam-liveness {
        down-count cells;
        up-count cells;
    }
    oam-period (seconds | disable);
    shaping {
        (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
        burst length);
        queue-length number;
    }
}
}
clocking clock-source;
data-input (system | interface interface-name);
dce;
serial-options {
    clock-rate rate;
    clocking-mode (dce | internal | loop);
    control-polarity (negative | positive);
    cts-polarity (negative | positive);
    dcd-polarity (negative | positive);
    dce-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
        dcd (ignore | normal | require);
        dsr (ignore | normal | require);
        dtr signal-handling-option;
        ignore-all;
        indication (ignore | normal | require);
        rts (assert | de-assert | normal);
        tm (ignore | normal | require);
    }
    dsr-polarity (negative | positive);
    dte-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
        dcd (ignore | normal | require);
        dsr (ignore | normal | require);
        dtr signal-handling-option;
        ignore-all;
        indication (ignore | normal | require);
        rts (assert | de-assert | normal);
        tm (ignore | normal | require);
    }
}
dtr-circuit (balanced | unbalanced);
dtr-polarity (negative | positive);
encoding (nrz | nrzi);
indication-polarity (negative | positive);
```

```

line-protocol protocol;
loopback mode;
rts-polarity (negative | positive);
tm-polarity (negative | positive);
transmit-clock invert;
}
description text;
dialer-options {
    pool pool-name <priority priority>;
}
disable;
ds0-options {
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    byte-encoding (nx56 | nx64);
    fcs (16 | 32);
    idle-cycle-flag (flags | ones);
    invert-data;
    loopback payload;
    start-end-flag (filler | shared);
}
e1-options {
    bert-error-rate rate;
    bert-period seconds;
    fcs (16 | 32);
    framing (g704 | g704-no-crc4 | unframed);
    idle-cycle-flag (flags | ones);
    invert-data;
    loopback (local | remote);
    start-end-flag (filler | shared);
    timeslots time-slot-range;
}
e3-options {
    atm-encapsulation (direct | plcp);
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    framing feet;
    compatibility-mode (digital-link | kentrox | larscom) <subrate value>;
    fcs (16 | 32);
    framing (g.751 | g.832);
    idle-cycle-flag (filler | shared);
    invert-data;
    loopback (local | remote);
    (payload-scrambler | no-payload-scrambler);
    start-end-flag (filler | shared);
    (unframed | no-unframed);
}
encapsulation type;
es-options {
    backup-interface es-fpc/pic/port;
}
fastether-options {
    802.3ad aex;
    (flow-control | no-flow-control);
}

```

```
ignore-l3-incompletes;
ingress-rate-limit rate;
(loopback | no-loopback);
mpls {
  pop-all-labels {
    required-depth number;
  }
}
source-address-filter {
  mac-address;
}
(source-filtering | no-source-filtering);
}
flexible-vlan-tagging;
gigether-options {
  802.3ad aex;
  (asynchronous-notification | no-asynchronous-notification);
  (auto-negotiation | no-auto-negotiation) remote-fault <local-interface-online |
    local-interface-offline>;
  auto-reconnect seconds;
  (flow-control | no-flow-control);
  ignore-l3-incompletes;
  (loopback | no-loopback);
  mpls {
    pop-all-labels {
      required-depth number;
    }
  }
}
no-auto-mdix;
source-address-filter {
  mac-address;
}
(source-filtering | no-source-filtering);
ethernet-switch-profile {
  (mac-learn-enable | no-mac-learn-enable);
  tag-protocol-id [ tpids ];
  ethernet-policer-profile {
    input-priority-map {
      ieee802.1p premium [ values ];
    }
    output-priority-map {
      classifier {
        premium {
          forwarding-class class-name {
            loss-priority (high | low);
          }
        }
      }
    }
  }
}
policer cos-policer-name {
  aggregate {
    bandwidth-limit bps;
    burst-size-limit bytes;
  }
  premium {
    bandwidth-limit bps;
  }
}
```

9

```
n393dce number;  
n393dte number;  
t391dte seconds;  
t392dce seconds;  
}  
lsq-failure-options {  
  no-termination-request;  
  [ trigger-link-failure interface-name ];  
}  
mac mac-address;  
mlfr-uni-nni-bundle-options {  
  acknowledge-retries number;  
  acknowledge-timer milliseconds;  
  action-red-differential-delay (disable-tx | remove-link);  
  drop-timeout milliseconds;  
  fragment-threshold bytes;  
  cisco-interoperability send-lip-remove-link-for-link-reject;  
  hello-timer milliseconds;  
  link-layer-overhead percent;  
  lmi-type (ansi | itu);  
  minimum-links number;  
  mrru bytes;  
  n391 number;  
  n392 number;  
  n393 number;  
  red-differential-delay milliseconds;  
  t391 seconds;  
  t392 seconds;  
  yellow-differential-delay milliseconds;  
}  
modem-options {  
  dialin (console | routable);  
  init-command-string initialization-command-string;  
}  
mtu bytes;  
multiservice-options {  
  (core-dump | no-core-dump);  
  (syslog | no-syslog);  
}  
native-vlan-id number;  
no-gratuitous-arp-request;  
no-keepalives;  
no-partition {  
  interface-type type;  
}  
otn-options {  
  fec (efec | gfec | none);  
  (laser-enable | no-laser-enable);  
  (line-loopback | no-line-loopback);  
  pass-thru;  
  rate (fixed-stuff-bytes | no-fixed-stuff-bytes | pass-thru);  
  transmit-payload-type number;  
  trigger (oc-lof | oc-lom | oc-los | oc-wavelength-lock | odu-ais | odu-bbe-th | odu-bdi  
    | odu-es-th | odu-lck | odu-oci | odu-sd | odu-ses-th | odu-ttim | odu-uas-th |  
    opu-ptm | otu-ais | otu-bbe-th | otu-bdi | otu-es-th | otu-fec-deg | otu-fec-exe |  
    otu-iae | otu-sd | otu-ses-th | otu-ttim | otu-uas-th);
```



```

tti;
}
optics-options {
  wavelength nm;
  alarm alarm-name {
    (syslog | link-down);
  }
  warning warning-name {
    (syslog | link-down);
  }
}
partition partition-number oc-slice oc-slice-range interface-type type;
timeslots time-slot-range;
passive-monitor-mode;
per-unit-scheduler;
ppp-options {
  chap {
    access-profile name;
    default-chap-secret name;
    local-name name;
    passive;
  }
  compression {
    acfc;
    pfc;
  }
  dynamic-profile profile-name;
  no-termination-request;
  pap {
    access-profile name;
    local-name name;
    local-password password;
    compression;
  }
}
receive-bucket {
  overflow (discard | tag);
  rate percentage;
  threshold bytes;
}
redundancy-options {
  priority sp-fpc/pic/port;
  secondary sp-fpc/pic/port;
  hot-standby;
}
satop-options {
  payload-size n;
}
schedulers number;
serial-options {
  clock-rate rate;
  clocking-mode (dce | internal | loop);
  control-polarity (negative | positive);
  cts-polarity (negative | positive);
  dcd-polarity (negative | positive);
  dce-options {

```

```
control-signal (assert | de-assert | normal);
cts (ignore | normal | require);
dcd (ignore | normal | require);
dsr (ignore | normal | require);
dtr signal-handling-option;
ignore-all;
indication (ignore | normal | require);
rts (assert | de-assert | normal);
tm (ignore | normal | require);
}
dsr-polarity (negative | positive);
dte-options {
    control-signal (assert | de-assert | normal);
    cts (ignore | normal | require);
    dcd (ignore | normal | require);
    dsr (ignore | normal | require);
    dtr signal-handling-option;
    ignore-all;
    indication (ignore | normal | require);
    rts (assert | de-assert | normal);
    tm (ignore | normal | require);
}
dtr-circuit (balanced | unbalanced);
dtr-polarity (negative | positive);
encoding (nrz | nrzi);
indication-polarity (negative | positive);
line-protocol protocol;
loopback mode;
rts-polarity (negative | positive);
tm-polarity (negative | positive);
transmit-clock invert;
}
services-options {
    inactivity-timeout seconds;
    open-timeout seconds;
    session-limit {
        maximum number;
        rate new-sessions-per-second;
    }
    syslog {
        host hostname {
            facility-override facility-name;
            log-prefix prefix-number;
            services priority-level;
        }
    }
}
shdsl-options {
    annex (annex-a | annex-b);
    line-rate line-rate;
    loopback (local | remote);
    snr-margin {
        current margin;
        snext margin;
    }
}
```

```

sonet-options {
  aggregate asx;
  aps {
    advertise-interval milliseconds;
    annex-b;
    authentication-key key;
    force;
    hold-time milliseconds;
    lockout;
    neighbor address;
    paired-group group-name;
    preserve-interface;
    protect-circuit group-name;
    request;
    revert-time seconds;
    switching-mode (bidirectional | unidirectional);
    working-circuit group-name;
  }
  bytes {
    c2 value;
    e1-quiet value;
    f1 value;
    f2 value;
    s1 value;
    z3 value;
    z4 value;
  }
  fcs (16 | 32);
  loopback (local | remote);
  mpls {
    pop-all-labels {
      required-depth number;
    }
  }
  path-trace trace-string;
  (payload-scrambler | no-payload-scrambler);
  rfc-2615;
  trigger {
    defect ignore;
    hold-time up milliseconds down milliseconds;
  }
  vtmapping (itu-t | klm);
  (z0-increment | no-z0-increment);
}
speed (10m | 100m | 1g | oc3 | oc12 | oc48);
stacked-vlan-tagging;
switch-options {
  switch-port port-number {
    (auto-negotiation | no-auto-negotiation);
    speed (10m | 100m | 1g);
    link-mode (full-duplex | half-duplex);
  }
}
t1-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
}

```

```
bert-period seconds;
buildout value;
byte-encoding (nx56 | nx64);
crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);
crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);
fcs (16 | 32);
framing (esf | sf);
idle-cycle-flag (flags | ones);
invert-data;
line-encoding (ami | b8zs);
loopback (local | payload | remote);
remote-loopback-respond;
start-end-flag (filler | shared);
timeslots time-slot-range;
}
t3-options {
  atm-encapsulation (direct | plcp);
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  buildout feet;
  (cbits-parity | no-cbits-parity);
  compatibility-mode (adtran | digital-link | kentrox | larscom | verilink) <subrate
    value>;
  fcs (16 | 32);
  (feac-loop-respond | no-feac-loop-respond);
  idle-cycle-flag value;
  (long-buildout | no-long-buildout);
  (loop-timing | no-loop-timing);
  loopback (local | payload | remote);
  (mac | no-mac);
  (payload-scrambler | no-payload-scrambler);
  start-end-flag (filler | shared);
}
traceoptions {
  flag flag <flag-modifier> <disable>;
}
transmit-bucket {
  overflow discard;
  rate percentage;
  threshold bytes;
}
(traps | no-traps);
unidirectional;
vlan-tagging;
vlan-vci-tagging;
unit logical-unit-number {
  accept-source-mac {
    mac-address mac-address {
      policer {
        input cos-policer-name;
        output cos-policer-name;
      }
    }
  }
}
accounting-profile name;
```

```

allow-any-vci;
atm-scheduler-map (map-name | default);
backup-options {
    interface interface-name;
}
bandwidth rate;
cell-bundle-size cells;
clear-dont-fragment-bit;
compression {
    rtp {
        f-max-period number;
        maximum-contexts number <force>;
        queues [ queue-numbers ];
        port {
            minimum port-number;
            maximum port-number;
        }
    }
}
compression-device interface-name;
copy-tos-to-outer-ip-header;
demux-destination family;
demux-source family;
demux-options {
    underlying-interface interface-name;
}
description text;
dial-options {
    l2tp-interface-id name;
    (dedicated | shared);
}
dialer-options {
    activation-delay seconds;
    callback;
    callback-wait-period time;
    deactivation-delay seconds;
    dial-string [ dial-string-numbers ];
    idle-timeout seconds;
    incoming-map {
        caller (caller-id | accept-all);
        initial-route-check seconds;
        load-interval seconds;
        load-threshold percent;
        pool pool-name;
        redial-delay time;
        watch-list {
            [ routes ];
        }
    }
}
disable;
disable-mlppp-inner-ppp-pfc;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
    activation-priority priority;
}

```

```
    bearer-bandwidth-limit kilobits-per-second;
  }
  encapsulation type;
  epd-threshold cells plp1 cells;
  fragment-threshold bytes;
  inner-vlan-id-range start start-id end end-id;
  input-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
  }
  interleave-fragments;
  inverse-arp;
  layer2-policer {
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
    output-three-color policer-name;
  }
  link-layer-overhead percent;
  minimum-links number;
  mrru bytes;
  multicast-dlci dlci-identifier;
  multicast-vci vpi-identifier.vci-identifier;
  multilink-max-classes number;
  multipoint;
  oam-liveness {
    down-count cells;
    up-count cells;
  }
  oam-period (seconds | disable);
  output-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
  }
  passive-monitor-mode;
  peer-unit unit-number;
  plp-to-clp;
  point-to-point;
  ppp-options {
    chap {
      access-profile name;
      default-chap-secret name;
      local-name name;
      passive;
    }
    compression {
      acfc;
      pfc;
      pap;
      default-pap-password password;
    }
  }
}
```

```

    local-name name;
    local-password password;
    passive;
}
dynamic-profile profile-name;
lcp-max-conf-req number;
lcp-restart-timer milliseconds;
loopback-clear-timer seconds;
ncp-max-conf-req number;
ncp-restart-timer milliseconds;
}
pppoe-options {
    access-concentrator name;
    auto-reconnect seconds;
    (client | server);
    service-name name;
    underlying-interface interface-name;
}
proxy-arp;
service-domain (inside | outside);
shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
    burst length);
    queue-length number;
}
short-sequence;
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
    backup-destination address;
    destination address;
    key number;
    routing-instance {
        destination routing-instance-name;
    }
    source source-address;
    ttl number;
}
vci vpi-identifier.vci-identifier;
vci-range start start-vci end end-vci;
vpi vpi-identifier;
vlan-id number;
vlan-id-list [vlan-id vlan-id-vlan-id];
vlan-id-range number-number;
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
vlan-tags-outer tpid.vlan-id inner-list [vlan-id vlan-id-vlan-id];
family family {
    accounting {
        destination-class-usage;
        source-class-usage {
            direction;
        }
    }
}
access-concentrator name;

```

```
address address {
  destination address;
}
bundle ml-fpc/pic/port | ls-fpc/pic/port);
duplicate-protection;
dynamic-profile profile-name;
filter {
  group filter-group-number;
  input filter-name;
  input-list {
    [ filter-names ];
    output filter-name;
  }
  output-list {
    [ filter-names ];
  }
}
ipsec-sa sa-name;
keep-address-and-control;
max-sessions number;
mtu bytes;
multicast-only;
negotiate-address;
no-redirects;
policer {
  arp policer-template-name;
  input policer-template-name;
  output policer-template-name;
}
primary;
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check {
  fail-filter filter-name;
  mode loose;
}
sampling {
  direction;
}
service {
  input {
    service-set service-set-name <service-filter filter-name>;
    post-service-filter filter-name;
  }
  output {
    service-set service-set-names <service-filter filter-name>;
  }
}
service-name-table table-name
targeted-broadcast {
  forward-and-send-to-re;
  forward-only;
}
(translate-discard-eligible | no-translate-discard-eligible);
```

19

[edit logical-systems] Hierarchy Level

The following lists the statements that can be configured at the **[edit logical-systems]** hierarchy level that are also documented in this manual. For more information about logical systems, see the *Junos OS Routing Protocols Configuration Guide*.

```
logical-systems logical-system-name {  
  interfaces interface-name {  
    unit logical-unit-number {  
      accept-source-mac {  
        mac-address mac-address {  
          policer {  
            input cos-policer-name;  
            output cos-policer-name;  
          }  
        }  
      }  
    }  
    allow-any-vci;  
    atm-scheduler-map (map-name | default);  
    bandwidth rate;  
    backup-options {  
      interface interface-name;  
    }  
    cell-bundle-size cells;  
    clear-dont-fragment-bit;  
    compression {  
      rtp {  
        f-max-period number;  
        port {  
          minimum port-number;  
          maximum port-number;  
        }  
      }  
      queues [ queue-numbers ];  
    }  
  }  
  compression-device interface-name;  
  description text;  
  dial-options {  
    l2tp-interface-id name;  
    (dedicated | shared);  
  }  
  dialer-options {  
    activation-delay seconds;  
    deactivation-delay seconds;  
    dial-string [ dial-string-numbers ];  
    idle-timeout seconds;  
    initial-route-check seconds;  
    load-threshold number;  
    pool pool;  
    remote-name remote-callers;  
    watch-list {  
      [ routes ];  
    }  
  }  
}
```

```

disable;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
    activation-priority priority;
    bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
fragment-threshold bytes;
input-vlan-map {
    inner-tag-protocol-id;
    inner-vlan-id;
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    tag-protocol-id tpid;
    vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
    output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
    up-count cells;
    down-count cells;
}
oam-period (seconds | disable);
output-vlan-map {
    inner-tag-protocol-id;
    inner-vlan-id;
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-swap);
    tag-protocol-id tpid;
    vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
    chap {
        access-profile name;
        default-chap-secret name;
        local-name name;
        passive;
    }
    compression {

```

```
    acfc;
    pfc;
  }
}
dynamic-profile profile-name;
pap {
  default-pap-password password;
  local-name name;
  local-password password;
  passive;
}
}
proxy-arp;
service-domain (inside | outside);
shaping {
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
  burst length);
  queue-length number;
}
short-sequence;
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
  backup-destination address;
  destination address;
  key number;
  routing-instance {
    destination routing-instance-name;
  }
  source source-address;
  ttl number;
}
vci vpi-identifier.vci-identifier;
vlan-id number;
vlan-id-list [vlan-id vlan-id-vlan-id]
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
vlan-tags outer tpid.vlan-id inner-list [vlan-id vlan-id-vlan-id]
vpi vpi-identifier;
family family {
  accounting {
    destination-class-usage;
    source-class-usage {
      direction;
    }
  }
}
bundle interface-name;
filter {
  group filter-group-number;
  input filter-name;
  input-list {
    [ filter-names ];
  }
  output filter-name;
  output-list {
```

```

    [ filter-names ];
  }
}
ipsec-sa sa-name;
keep-address-and-control;
mtu bytes;
multicast-only;
no-redirects;
policer {
  arp policer-template-name;
  input policer-template-name;
  output policer-template-name;
}
primary;
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check <fail-filter filter-name> {
  <mode loose>;
}
sampling {
  direction;
}
service {
  input {
    service-set service-set-name <service-filter filter-name>;
    post-service-filter filter-name;
  }
  output {
    service-set service-set-name <service-filter filter-name>;
  }
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
unnumbered-address interface-name destination address destination-profile
  profile-name;
address address {
  arp ip-address (mac | multicast-mac) mac-address <publish>;
  broadcast address;
  destination address;
  destination-profile name;
  eui-64;
  multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
  multipoint-destination address {
    epd-threshold cells plp1 cells;
    inverse-arp;
    oam-liveness {
      up-count cells;
      down-count cells;
    }
    oam-period (seconds | disable);
    shaping {
      (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
        rate burst length);
      queue-length number;
    }
  }
}

```

```
    }
    vci vpi-identifier.vci-identifier;
  }
  preferred;
  primary;
  (vrrp-group | vrrp-inet6-group) group-number {
    (accept-data | no-accept-data);
    advertise-interval seconds;
    authentication-type authentication;
    authentication-key key;
    fast-interval milliseconds;
    (preempt | no-preempt) {
      hold-time seconds;
    }
  }
  priority-number number;
  track {
    priority-cost seconds;
    priority-hold-time interface-name {
      interface priority;
      bandwidth-threshold bits-per-second {
        priority;
      }
    }
  }
  route ip-address/mask routing-instance instance-name priority-cost cost;
}
virtual-address [ addresses ];
}
}
}
```

PART 2

Router Interfaces Configuration Concepts

- Understanding Router Interfaces on page 27
- Configuring Physical Interface Properties on page 65
- Configuring Logical Interface Properties on page 151
- Configuring Protocol Family and Interface Address Properties on page 177
- Configuring Circuit and Translational Cross-Connects on page 229
- Tracing Interface Operations on page 247

CHAPTER 2

Understanding Router Interfaces

- Router Interfaces Overview on page 28
- Types of Interfaces Overview on page 28
- Permanent Interfaces Overview on page 29
- Understanding Management Ethernet Interfaces on page 29
- Understanding Internal Ethernet Interfaces on page 30
- Understanding Transient Interfaces on page 32
- Understanding Services Interfaces on page 33
- Container Interfaces Overview on page 34
- Interface Encapsulations Overview on page 36
- Interface Descriptors Overview on page 47
- Interface Naming Overview on page 48
- Displaying Interface Configurations Overview on page 61
- Synchronous Ethernet Overview on page 62
- Interface and Router Clock Sources Overview on page 63

Router Interfaces Overview

Routers typically contain several different types of interfaces suited to various functions. For the interfaces on a router to function, you must configure them, specifying properties such as the interface location (that is, the slot in which the Flexible PIC Concentrator [FPC] or Dense Port Concentrator [DPC] is installed, and the location where the Physical Interface Card [PIC] is installed), the interface type (such as SONET/SDH, Asynchronous Transfer Mode [ATM], or Ethernet), encapsulation, and interface-specific properties. You can configure the interfaces that are currently present in the router, and you can also configure interfaces that are not currently present but that you might add in the future. When a configured interface appears, the Junos OS detects its presence and applies the appropriate configuration to it.

To determine which interfaces are currently installed in the router, issue the **show interfaces terse** operational mode command. If an interface is listed in the output, it is installed in the router. If an interface is not listed in the output, it is not installed in the router.

For information about which PICs are supported on your router, see your router's PIC guide.

You can configure Junos class-of-service (CoS) properties to provide a variety of classes of service for different applications, including multiple forwarding classes for managing packet transmission, congestion management, and CoS-based forwarding. For more information about configuring CoS properties, see the [Junos OS Class of Service Configuration Guide](#).

Types of Interfaces Overview

Interfaces can be permanent or transient, and are used for networking or services:

- Permanent interfaces—Interfaces that are always present in the router.
- Transient interfaces—Interfaces that can be inserted into or removed from the router depending on your network configuration needs.
- Networking interfaces—Interfaces, such as Ethernet or SONET/SDH interfaces, that primarily provide traffic connectivity.
- Services interfaces—Interfaces that provide specific capabilities for manipulating traffic before it is delivered to its destination.
- Container interfaces—Interfaces that support automatic protection switching (APS) on physical SONET links using a virtual container infrastructure.

The Junos OS internally generates nonconfigurable interfaces which are described in *Interfaces Command Reference* and *Services Interfaces*.

Related Documentation

- Permanent Interfaces Overview on page 29
- Understanding Transient Interfaces on page 32

- Understanding Services Interfaces on page 33 and [Junos OS Services Interfaces Configuration Guide](#)
- Container Interfaces Overview on page 34
- See also the following sections regarding specific networking interface technologies used in your routers:
 - ATM Interfaces Overview
 - Channelized Interfaces Overview
 - Circuit Emulation Interfaces: Mobile Backhaul and Circuit Emulation Overview
 - E1 Interfaces Overview and E3 Interfaces Overview
 - Ethernet Interfaces Overview
 - Frame Relay Overview
 - ISDN Interfaces Overview
 - SONET/SDH Interfaces Overview
 - T1 Interfaces Overview and T3 Interfaces Overview

Permanent Interfaces Overview

Permanent interfaces in the router consist of management Ethernet interfaces and internal Ethernet interfaces.



NOTE: The Routing Engines in the TX Matrix Plus router and in the T1600 routers configured in a routing matrix do not support the management Ethernet interface `fxp0` or the internal Ethernet interfaces `fxp1` or `fxp2`.

Related Documentation

- Understanding Management Ethernet Interfaces on page 29
- Understanding Internal Ethernet Interfaces on page 30

Understanding Management Ethernet Interfaces

The management Ethernet interface on the router provides an out-of-band method for connecting to the router. You can connect to the management interface over the network using utilities such as ssh and telnet. The Simple Network Management Protocol (SNMP) can use the management interface to gather statistics from the router.

- For most Routing Engines, the Junos OS automatically creates the router's management Ethernet interface, `fxp0`. To use `fxp0` as a management port, you must configure its logical port, `fxp0.0`, with a valid IP address.



NOTE: On M Series routers and T Series routers running Junos OS later than Release 7.0R2.7 or Release 7.1R2.2, the **fxp0** interface does not support load-sharing next hops. This restriction only affects **fxp0** routes.

- For routers with RE2600 and RE1800 Routing Engines, the Junos OS automatically creates the router's management Ethernet interface, **em0**. To use **em0** as a management port, you must configure its logical port, **em0.0**, with a valid IP address.



NOTE: When upgrading to a Routing Engine that supports **em0** from a Routing Engine that supports **fxp0**, automated scripts have been developed to convert existing configuration file references from **fxp0**, **fxp1**, or **fxp2** interfaces to **em0** interfaces. Whether using a script or editing the configuration files manually, you must revise any command lines that reference the router management Ethernet interface **fxp0** by replacing "**fxp0**" with "**em0**."

- J Series routers—For the Juniper Networks J Series Services Routers, you can use any of the built-in Ethernet ports as a management interface. To use a built-in interface as a management Ethernet interface, configure it with a valid IP address. The factory configuration for the J4350 and J6350 Services Routers automatically enables the J-Web user interface on the **ge-0/0/0**, **ge-0/0/1**, **ge-0/0/2**, and **ge-0/0/3** interfaces. To manually configure J-Web access, include the **interface interface-name** statement at the **[edit system services web-management http]** hierarchy level.

For information about establishing basic connectivity and configuring a management port, see the *Getting Started* guide for your router.

**Related
Documentation**

- Permanent Interfaces Overview on page 29

Understanding Internal Ethernet Interfaces

Internal Ethernet interfaces on the router provide communication between the Routing Engine and the Packet Forwarding Engine. The Junos OS boots the packet-forwarding component hardware. When these components are running, the Control Board uses the internal Ethernet interface to transmit hardware status information to the Routing Engine (the portion of the router running the Junos OS). Information transmitted includes the internal router temperature, the condition of the fans, whether an FPC has been removed or inserted, and information from the craft interface on the LCD panel. The internal Ethernet interface is configured automatically when the Junos OS boots.

- J Series, M Series, and MX Series routers and most T Series routers—For J Series, M Series, and MX Series routers, and for T Series routers other than TX Matrix Plus routers or T1600 routers configured in a routing matrix, the Junos OS creates the internal Ethernet interface **fxp1**. The internal Ethernet interface connects the Routing Engine **re0** (the portion of the router running the Junos OS) to the Packet Forwarding Engine. If the router has redundant Routing Engines, another internal Ethernet interface, **fxp2**,

is created on each Routing Engine (**re0** and **re1**) in order to support fault tolerance. Two physical links between **re0** and **re1** connect the independent control planes. If one of the links fails, both Routing Engines can use the other link for IP communication.

- TX Matrix Plus routers—On a TX Matrix Plus router, the Routing Engine (RE-TXP-SFC) and Control Board (TXP-CB) function as a unit, or host subsystem. For each host subsystem in the router, the Junos OS automatically creates two internal Ethernet interfaces, **ixgbe0** and **ixgbe1**, for the two 10-Gigabit Ethernet ports on the Routing Engine.

The 10-Gigabit Ethernet port at the **ixgbe0** interface connects the TX Matrix Plus Routing Engine to the Routing Engines of every T1600 router configured in the routing matrix.

- The port connects the Routing Engine to a 10-Gigabit Ethernet switch on the local Control Board.
- The 10-Gigabit Ethernet switch connects the Control Board to a Gigabit Ethernet switch on the same local Control Board.
- The Gigabit Ethernet switch connects the Control Board to the remote Routing Engines of every T1600 router configured in the routing matrix.

If a TX Matrix Plus router contains redundant host subsystems, the independent control planes are connected by two physical links between the two 10-Gigabit Ethernet ports on their respective Routing Engines.

- The primary link to the remote Routing Engine is at the **ixgbe0** interface; the 10-Gigabit Ethernet switch on the local Control Board also connects the Routing Engine to the 10-Gigabit Ethernet port accessed by the **ixgbe1** interface on the remote Routing Engine.
- The alternate link to the remote Routing Engine is the 10-Gigabit Ethernet port at the **ixgbe1** interface. This second port connects the Routing Engine to the 10-Gigabit Ethernet switch on the remote Control Board, which connects to the 10-Gigabit Ethernet port at the **ixgbe0** interface on the remote Routing Engine.

If one of the two links between the host subsystems fails, both Routing Engines can use the other link for IP communication.

- T1600 routers in a routing matrix—On a T1600 router configured in a routing matrix, the Routing Engine (RE-TXP-LCC) and Control Board (LCC-CB) function as a unit, or host subsystem. For each host subsystem in the router, the Junos OS automatically creates two internal Ethernet interfaces, **bcm0** and **em1**, for the two Gigabit Ethernet ports on the Routing Engine.

The Gigabit Ethernet port at the **bcm0** interface connects the LCC Routing Engine to the Routing Engines of every other T1600 router configured in the routing matrix.

- The port connects the Routing Engine to a Gigabit Ethernet switch on the local Control Board.
- The switch connects the Control Board to the remote Routing Engines of every other T1600 router configured in the routing matrix.

If a T1600 router in a routing matrix contains redundant host subsystems, the independent control planes are connected by two physical links between the Gigabit Ethernet ports on their respective Routing Engines.

- The primary link to the remote Routing Engine is at the **bcm0** interface; the Gigabit Ethernet switch on the local Control Board also connects the Routing Engine to the Gigabit Ethernet port accessed by the **em1** interface on the remote Routing Engine.
- The alternate link to the remote Routing Engine is at the **em1** interface. This second port connects the Routing Engine to the Gigabit Ethernet switch on the remote Control Board, which connects to the Gigabit Ethernet port at the **bcm0** interface on the remote Routing Engine.

If one of the two links between the host subsystems fails, both Routing Engines can use the other link for IP communication.

Each router also has two serial ports, labeled *console* and *auxiliary*, for connecting tty type terminals to the router using standard PC-type tty cables. Although these ports are not network interfaces, they do provide access to the router.

Related Documentation

- Permanent Interfaces Overview on page 29

Understanding Transient Interfaces

The M Series, MX Series, and T Series routers contain slots for installing FPCs. PICs can be installed in FPCs. The number of PICs that can be installed varies by router and type of FPC. The PICs provide the actual physical interfaces to the network. The MX Series routers contain slots for installing either DPC boards that provide the physical interfaces to the network or for installing FPCs in which PICs can be installed. These physical interfaces are transient interfaces of the router. They are referred to as transient because you can hot-swap a DPC or FPC and its PICs at any time.

You can insert any DPC or FPC into any slot that supports them in the appropriate router. Typically, you can place any combination of PICs, compatible with your router, in any location on an FPC. (You are limited by the total FPC bandwidth, and by the fact that some PICs physically require two or four of the PIC locations on the FPC. In some cases, power limitations or microcode limitations may also apply.) To determine DPC and PIC compatibility, see the *Hardware Guide*, *DPC Guide*, and *PIC Guide* for your router.

You must configure each transient interface based on the slot in which the FPC is installed, the location in which the PIC is installed, and for multiple port PICs, the port to which you are connecting.

You can configure the interfaces on PICs that are already installed in the router as well as interfaces on PICs that you plan to install later. The Junos OS detects which interfaces are actually present, so when the software activates its configuration, it activates only the present interfaces and retains the configuration information for the interfaces that are not present. When the Junos OS detects that an FPC containing PICs has been inserted into the router, the software activates the configuration for those interfaces.

- Related Documentation**
- Types of Interfaces Overview on page 28

Understanding Services Interfaces

Services interfaces enable you to incrementally add services to your network. The Junos OS supports the following services PICs:

- **Adaptive Services (AS) PICs**—Allow you to provide multiple services on a single PIC by configuring a set of services and applications. The AS PICs offer a special range of services you configure in one or more service sets.
- **ES PIC**—Provides a security suite for the IP version 4 (IPv4) and IP version 6 (IPv6) network layers. The suite provides functionality such as authentication of origin, data integrity, confidentiality, replay protection, and nonrepudiation of source. It also defines mechanisms for key generation and exchange, management of security associations, and support for digital certificates.
- **Monitoring Services PICs**—Enable you to monitor traffic flow and export the monitored traffic. Monitoring traffic allows you to gather and export detailed information about IPv4 traffic flows between source and destination nodes in your network; sample all incoming IPv4 traffic on the monitoring interface and present the data in cflowd record format; perform discard accounting on an incoming traffic flow; encrypt or tunnel outgoing cflowd records, intercepted IPv4 traffic, or both; and direct filtered traffic to different packet analyzers and present the data in its original format. On a Monitoring Services II PIC, you can configure either monitoring interfaces or collector interfaces. A collector interface allows you to combine multiple cflowd records into a compressed ASCII data file and export the file to an FTP server.
- **Multilink Services, MultiServices, Link Services, and Voice Services PICs**—Enable you to split, recombine, and sequence datagrams across multiple logical data links. The goal of multilink operation is to coordinate multiple independent links between a fixed pair of systems, providing a virtual link with greater bandwidth than any of the members.
- **Tunnel Services PIC**—By encapsulating arbitrary packets inside a transport protocol, tunneling provides a private, secure path through an otherwise public network. Tunnels connect discontinuous subnetworks and enable encryption interfaces, virtual private networks (VPNs), and Multiprotocol Label Switching (MPLS).
- **On M Series and T Series routers**, logical tunnel interfaces allow you to connect logical systems, virtual routers, or VPN instances. For more information about VPNs, see the [Junos OS VPNs Configuration Guide](#). For more information about configuring tunnels, see the [Junos OS Services Interfaces Configuration Guide](#).
- **Services (J Series)**—On J Series Services Routers, the `lt` interface is an internal interface only and is not associated with a physical medium or PIM. You can configure the logical tunnel interface to provide class-of-service (CoS) support for real-time performance monitoring (RPM) probe packets. For more information, see the [Junos OS Interfaces and Routing Configuration Guide](#).



NOTE: The lt interface on the J Series router does not support logical systems.

Related Documentation

- Types of Interfaces Overview on page 28

Container Interfaces Overview

Container interfaces provide the following features:

- Automatic protection switching (APS) on SONET and ATM links are supported using the container infrastructure.
- Container physical interfaces and logical interfaces remain up on switchover.
- APS parameters are auto-copied from the container interface to the member links.



NOTE: Paired groups and true unidirectional APS are not currently supported.

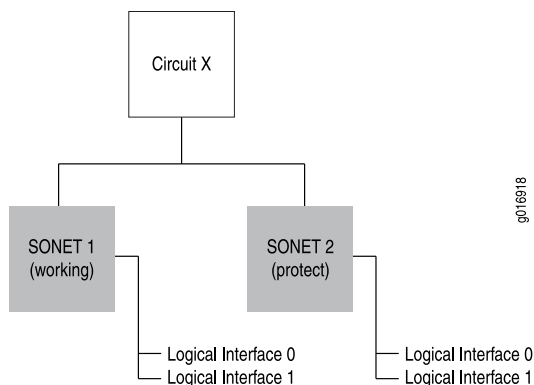
Container interfaces features are described in the following sections:

- Understanding Traditional APS Concept on page 34
- Container Interfaces Concept on page 35
- APS Support for Container-Based Interfaces on page 35
- Autocopy of APS Parameters on page 35

Understanding Traditional APS Concept

Traditional APS is configured on two independent physical SONET interfaces: one configured as the working circuit and the other as the protect circuit (see Figure 1 on page 34). The circuit, named Circuit X in the figure, is the link between the two SONET interfaces.

Figure 1: APS Interface

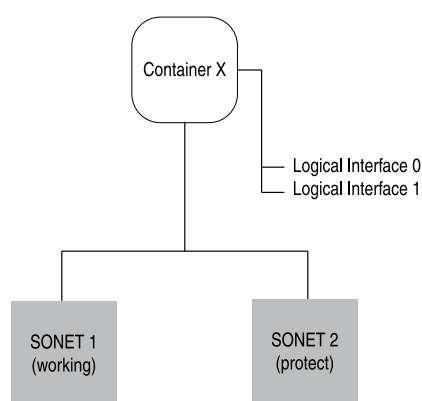


Traditional APS uses routing protocols that run on each individual SONET interface (since circuit is an abstract construct, instead of being an actual interface). When the working link goes down, the APS infrastructure brings up the protect link and its underlying logical interfaces, and brings down the working link and its underlying logical interfaces, causing the routing protocols to reconverge. This consumes time and leads to traffic loss even though the APS infrastructure has performed the switch quickly.

Container Interfaces Concept

To solve this problem, the Junos OS provides a soft interface construct called a container interface (see Figure 2 on page 35).

Figure 2: Container Interface



The container interface allows routing protocols to run on the logical interfaces associated with a virtual *container interface* instead of on the physical SONET and ATM interfaces. When APS switches the underlying physical link based on a fault condition, the container interface remains up, and the logical interface on the container interface does not flap. The routing protocols remain unaware of the APS switching.

APS Support for Container-Based Interfaces

With the container interface, APS is configured on the container interface itself. Individual member SONET and ATM links are either marked as primary (corresponding to the working circuit) or standby (corresponding to the protect circuit) in the configuration. No circuit or group name is specified in the container interface model; physical SONET and ATM links are put in an APS group by linking them to a single container interface. APS parameters are specified at the container interface level, and are propagated to the individual SONET and ATM links by the APS daemon.

Autocopy of APS Parameters

Typical applications require copying APS parameters from the working circuit to the protect circuit, since most of the parameters must be the same for both circuits. This is automatically done in the container interface. APS parameters are specified only once under the container physical interface configuration, and are internally copied over to the individual physical SONET and ATM links.

Related Documentation

- [Configuring SONET/SDH Physical Interface Properties](#)

- Configuring SONET/SDH Physical Interface Properties

Interface Encapsulations Overview

Table 3 on page 36 lists encapsulation support by interface type.

Table 3: Encapsulation Support by Interface Type

Interface Type	Physical Interface Encapsulation	Logical Interface Encapsulation
ae —Aggregated Ethernet interface	ethernet-ccc —Ethernet cross-connect extended-vlan-ccc —Nonstandard TPID tagging for a cross-connect extended-vlan-vpls —Extended VLAN virtual private LAN service flexible-ethernet-services —Allows per-unit Ethernet encapsulation configuration vlan-ccc —802.1Q tagging for a cross-connect ethernet-vpls —Ethernet virtual private LAN service vlan-vpls —VLAN virtual private LAN service	dix —Ethernet DIXv2 (RFC 894) vlan-ccc —802.1Q tagging for a cross-connect
as —Aggregated SONET/SDH interface	cisco-hdlc —Cisco-compatible HDLC framing ppp —Serial PPP device	NA
at —ATM1 interface	atm-ccc-cell-relay —ATM cell relay encapsulation for a cross-connect atm-pvc —ATM permanent virtual circuits ethernet-over-atm —Ethernet over ATM encapsulation	atm-ccc-cell-relay —ATM cell relay for CCC atm-ccc-vc-mux —ATM VC for CCC atm-cisco-nlpid —Cisco-compatible ATM NLPID encapsulation atm-nlpid —ATM NLPID encapsulation atm-snap —ATM LLC/SNAP encapsulation atm-tcc-snap —ATM LLC/SNAP for a translational cross-connect atm-tcc-vc-mux —ATM VC for a translational cross-connect atm-vc-mux —ATM VC multiplexing ether-over-atm-llc —Ethernet over ATM (LLC/SNAP) encapsulation

Table 3: Encapsulation Support by Interface Type (*continued*)

Interface Type	Physical Interface Encapsulation	Logical Interface Encapsulation
at —ATM2 intelligent queuing (IQ) interface	atm-ccc-cell-relay —ATM cell relay encapsulation for a cross-connect atm-pvc —ATM permanent virtual circuits ethernet-over-atm —Ethernet over ATM encapsulation	atm-ccc-cell-relay —ATM cell relay for CCC atm-ccc-vc-mux —ATM VC for CCC atm-cisco-nlpid —Cisco-compatible ATM NLPID encapsulation atm-mlppp-llc —ATM MLPPP over AAL5/LLC atm-nlpid —ATM NLPID encapsulation atm-ppp-llc —ATM PPP over AAL5/LLC atm-ppp-vc-mux —ATM PPP over raw AAL5 atm-snap —ATM LLC/SNAP encapsulation atm-tcc-snap —ATM LLC/SNAP for a translational cross-connect atm-tcc-vc-mux —ATM VC for a translational cross-connect atm-vc-mux —ATM VC multiplexing ether-over-atm-llc —Ethernet over ATM (LLC/SNAP) encapsulation ether-vpls-over-atm-llc —Ethernet VPLS over ATM (bridging) encapsulation
bcm —Gigabit Ethernet internal interfaces	NA	NA
br —Integrated Services Digital Network (ISDN) interface	NA	NA
ci —Container interface	cisco-hdlc —Cisco-compatible HDLC framing ppp —Serial PPP device	aps —SONET interface required for APS configuration.

Table 3: Encapsulation Support by Interface Type (*continued*)

Interface Type	Physical Interface Encapsulation	Logical Interface Encapsulation
ds —DS0 interface	cisco-hdlc —Cisco-compatible HDLC framing cisco-hdlc-ccc —Cisco-compatible HDLC framing for a cross-connect cisco-hdlc-tcc —Cisco-compatible HDLC framing for a translational cross-connect extended-frame-relay-ccc —Any Frame Relay DLCI for a cross-connect extended-frame-relay-tcc —Any Frame Relay DLCI for a translational cross-connect flexible-frame-relay —Multiple Frame Relay encapsulations frame-relay —Frame Relay encapsulation frame-relay-ccc —Frame Relay for a cross-connect frame-relay-port-ccc —Frame Relay port encapsulation for a cross-connect frame-relay-tcc —Frame Relay for a translational cross-connect multilink-frame-relay-uni-nni —Multilink Frame Relay UNI NNI (FRF.16) encapsulation ppp —Serial PPP device ppp-ccc —Serial PPP device for a cross-connect ppp-tcc —Serial PPP device for a translational cross-connect	frame-relay-ccc —Frame Relay DLCI for CCC frame-relay-ppp —PPP over Frame Relay frame-relay-tcc —Frame Relay DLCI for a translational cross-connect
dsc —Discard interface	NA	NA

Table 3: Encapsulation Support by Interface Type (*continued*)

Interface Type	Physical Interface Encapsulation	Logical Interface Encapsulation
e1 —E1 interface (including channelized STM1-to-E1 interfaces)	cisco-hdlc —Cisco-compatible HDLC framing	frame-relay-ccc —Frame Relay DLCI for CCC
	cisco-hdlc-ccc —Cisco-compatible HDLC framing for a cross-connect	frame-relay-ppp —PPP over Frame Relay
	cisco-hdlc-tcc —Cisco-compatible HDLC framing for a translational cross-connect	frame-relay-tcc —Frame Relay DLCI for a translational cross-connect
	extended-frame-relay-ccc —Any Frame Relay DLCI for a cross-connect	
	extended-frame-relay-tcc —Any Frame Relay DLCI for a translational cross-connect	
	flexible-frame-relay —Multiple Frame Relay encapsulations	
	frame-relay —Frame Relay encapsulation	
	frame-relay-ccc —Frame Relay for a cross-connect	
	frame-relay-port-ccc —Frame Relay port encapsulation for a cross-connect	
	frame-relay-tcc —Frame Relay for a translational cross-connect	
	multilink-frame-relay-uni-nni —Multilink Frame Relay UNI NNI (FRF.16) encapsulation	
	ppp —Serial PPP device	
	ppp-ccc —Serial PPP device for a cross-connect	
	ppp-tcc —Serial PPP device for a translational cross-connect	

Table 3: Encapsulation Support by Interface Type (*continued*)

Interface Type	Physical Interface Encapsulation	Logical Interface Encapsulation
e3 —E3 interface (including E3 IQ and IQE interfaces)	cisco-hdlc —Cisco-compatible HDLC framing	frame-relay-ccc —Frame Relay DLCI for CCC
	cisco-hdlc-ccc —Cisco-compatible HDLC framing for a cross-connect	frame-relay-ppp —PPP over Frame Relay
	cisco-hdlc-tcc —Cisco-compatible HDLC framing for a translational cross-connect	frame-relay-tcc —Frame Relay DLCI for a translational cross-connect
	extended-frame-relay-ccc —Any Frame Relay DLCI for a cross-connect	
	extended-frame-relay-tcc —Any Frame Relay DLCI for a translational cross-connect	
	flexible-frame-relay —Multiple Frame Relay encapsulations	
	frame-relay —Frame Relay encapsulation	
	frame-relay-ccc —Frame Relay for a cross-connect	
	frame-relay-port-ccc —Frame Relay port encapsulation for a cross-connect	
	frame-relay-tcc —Frame Relay for a translational cross-connect	
	ppp —Serial PPP device	
	ppp-ccc —Serial PPP device for a cross-connect	
	ppp-tcc —Serial PPP device for a translational cross-connect	
em —Management and internal Ethernet interfaces	NA	NA

Table 3: Encapsulation Support by Interface Type (*continued*)

Interface Type	Physical Interface Encapsulation	Logical Interface Encapsulation
fe —Fast Ethernet interface	ethernet-ccc —Ethernet cross-connect ethernet-tcc —Ethernet translational cross-connect ethernet-vpls —Ethernet virtual private LAN service extended-vlan-ccc —Nonstandard TPID tagging for a cross-connect extended-vlan-tcc —802.1Q tagging for a translational cross-connect extended-vlan-vpls —Extended VLAN virtual private LAN service vlan-ccc —802.1Q tagging for a cross-connect vlan-vpls —VLAN virtual private LAN service	dix —Ethernet DIXv2 (RFC 894) vlan-ccc —802.1Q tagging for a cross-connect vlan-vpls —VLAN virtual private LAN service
fxp —Management and internal Ethernet interfaces	NA	NA
ge —Gigabit Ethernet interface (including Gigabit Ethernet IQ interfaces)	ethernet-ccc —Ethernet cross-connect ethernet-tcc —Ethernet translational cross-connect ethernet-vpls —Ethernet virtual private LAN service extended-vlan-ccc —Nonstandard TPID tagging for a cross-connect extended-vlan-tcc —802.1Q tagging for a translational cross-connect extended-vlan-vpls —Extended VLAN virtual private LAN service flexible-ethernet-services —Allows per-unit Ethernet encapsulation configuration vlan-ccc —802.1Q tagging for a cross-connect vlan-vpls —VLAN virtual private LAN service	dix —Ethernet DIXv2 (RFC 894) vlan-ccc —802.1Q tagging for a cross-connect vlan-tcc —802.1Q tagging for a translational cross-connect vlan-vpls —VLAN virtual private LAN service
ixgbe —10-Gigabit Ethernet internal interfaces	NA	NA
lo —Loopback interface; the Junos OS automatically configures one loopback interface (lo0)	NA	NA

Table 3: Encapsulation Support by Interface Type (*continued*)

Interface Type	Physical Interface Encapsulation	Logical Interface Encapsulation
ls —Link services interface	multilink-frame-relay-uni-nni —Multilink Frame Relay UNI NNI (FRF.16) encapsulation	multilink-frame-relay-end-to-end —Multilink Frame Relay end-to-end (FRF.15) multilink-ppp —Multilink PPP
lsq —Link services IQ interface	multilink-frame-relay-uni-nni —Multilink Frame Relay UNI NNI (FRF.16) encapsulation	multilink-frame-relay-end-to-end —Multilink Frame Relay end-to-end (FRF.15) multilink-ppp —Multilink PPP
lt —Logical tunnel interface	NA	ethernet —Ethernet service ethernet-vpls —Ethernet virtual private LAN service ethernet-ccc —Ethernet cross-connect frame-relay —Frame Relay encapsulation frame-relay-ccc —Frame Relay for a cross-connect vlan —VLAN service vlan-ccc —802.1Q tagging for a cross-connect vlan-vpls —VLAN virtual private LAN service
ml —Multilink interface (including Multilink Frame Relay and MLPPP)	NA	multilink-frame-relay-end-to-end —Multilink Frame Relay end-to-end (FRF.15) multilink-ppp —Multilink PPP

Table 3: Encapsulation Support by Interface Type (*continued*)

Interface Type	Physical Interface Encapsulation	Logical Interface Encapsulation
se —Serial interface (including EIA-530, V.35, and X.21 interfaces)	cisco-hdlc —Cisco-compatible HDLC framing	frame-relay-ccc —Frame Relay DLCI for CCC
	cisco-hdlc-ccc —Cisco-compatible HDLC framing for a cross-connect	frame-relay-ppp —PPP over Frame Relay
	cisco-hdlc-tcc —Cisco-compatible HDLC framing for a translational cross-connect	frame-relay-tcc —Frame Relay DLCI for a translational cross-connect
	frame-relay —Frame Relay encapsulation	
	frame-relay-ccc —Frame Relay for a cross-connect	
	frame-relay-port-ccc —Frame Relay port encapsulation for a cross-connect	
	frame-relay-tcc —Frame Relay for a translational cross-connect	
	ppp —Serial PPP device	
	ppp-ccc —Serial PPP device for a cross-connect	
	ppp-tcc —Serial PPP device for a translational cross-connect	

Table 3: Encapsulation Support by Interface Type (*continued*)

Interface Type	Physical Interface Encapsulation	Logical Interface Encapsulation
so—SONET/SDH interface	cisco-hdlc —Cisco-compatible HDLC framing	frame-relay-ccc —Frame Relay DLCI for CCC
	cisco-hdlc-ccc —Cisco-compatible HDLC framing for a cross-connect	frame-relay-ppp —PPP over Frame Relay
	cisco-hdlc-tcc —Cisco-compatible HDLC framing for a translational cross-connect	frame-relay-tcc —Frame Relay DLCI for a translational cross-connect
	extended-frame-relay-ccc —Any Frame Relay DLCI for a cross-connect	multilink-frame-relay-end-to-end —IQE SONET PICs support Multilink Frame Relay end-to-end (FRF.15)
	extended-frame-relay-tcc —Any Frame Relay DLCI for a translational cross-connect	multilink-ppp —IQE SONET PICs support Multilink PPP
	flexible-frame-relay —Multiple Frame Relay encapsulations	
	frame-relay —Frame Relay encapsulation	
	frame-relay-ccc —Frame Relay for a cross-connect	
	frame-relay-port-ccc —Frame Relay port encapsulation for a cross-connect	
	frame-relay-tcc —Frame Relay for a translational cross-connect	
	ppp —Serial PPP device	
	ppp-ccc —Serial PPP device for a cross-connect	
	ppp-tcc —Serial PPP device for a translational cross-connect	

Table 3: Encapsulation Support by Interface Type (*continued*)

Interface Type	Physical Interface Encapsulation	Logical Interface Encapsulation
t1—T1 interface (including channelized DS3-to-DS1 interfaces)	cisco-hdlc —Cisco-compatible HDLC framing	frame-relay-ccc —Frame Relay DLCI for CCC
	cisco-hdlc-ccc —Cisco-compatible HDLC framing for a cross-connect	frame-relay-ppp —PPP over Frame Relay
	cisco-hdlc-tcc —Cisco-compatible HDLC framing for a translational cross-connect	frame-relay-tcc —Frame Relay DLCI for a translational cross-connect
	extended-frame-relay-ccc —Any Frame Relay DLCI for a cross-connect	
	extended-frame-relay-tcc —Any Frame Relay DLCI for a translational cross-connect	
	flexible-frame-relay —Multiple Frame Relay encapsulations	
	frame-relay —Frame Relay encapsulation	
	frame-relay-ccc —Frame Relay for a cross-connect	
	frame-relay-port-ccc —Frame Relay port encapsulation for a cross-connect	
	frame-relay-tcc —Frame Relay for a translational cross-connect	
	multilink-frame-relay-uni-nni —Multilink Frame Relay UNI NNI (FRF.16) encapsulation	
	ppp —Serial PPP device	
	ppp-ccc —Serial PPP device for a cross-connect	
	ppp-tcc —Serial PPP device for a translational cross-connect	

Table 3: Encapsulation Support by Interface Type (*continued*)

Interface Type	Physical Interface Encapsulation	Logical Interface Encapsulation
t3 —T3 interface (including channelized OC12-to-DS3 interfaces)	cisco-hdlc —Cisco-compatible HDLC framing cisco-hdlc-ccc —Cisco-compatible HDLC framing for a cross-connect cisco-hdlc-tcc —Cisco-compatible HDLC framing for a translational cross-connect extended-frame-relay-ccc —Any Frame Relay DLCI for a cross-connect extended-frame-relay-tcc —Any Frame Relay DLCI for a translational cross-connect flexible-frame-relay —Multiple Frame Relay encapsulations frame-relay —Frame Relay encapsulation frame-relay-ccc —Frame Relay for a cross-connect frame-relay-port-ccc —Frame Relay port encapsulation for a cross-connect frame-relay-tcc —Frame Relay for a translational cross-connect ppp —Serial PPP device ppp-ccc —Serial PPP device for a cross-connect ppp-tcc —Serial PPP device for a translational cross-connect	frame-relay-ccc —Frame Relay DLCI for CCC frame-relay-ppp —PPP over Frame Relay frame-relay-tcc —Frame Relay DLCI for a translational cross-connect
Controller-level channelized IQ interfaces (cau4 , coc1 , coc3 , coc12 , cstm1 , ct1 , ct3 , ce1)	NA	NA
Services interfaces (cp , gr , ip , mo , vt , es , mo , rsp , sp)	NA	NA
Unconfigurable, internally generated interfaces (gre , ipip , learning-chip (lc), lsi , tap , mt , mtun , pd , pe , pimd , pime)	NA	NA

Related Documentation

Interface Descriptors Overview

When you configure an interface, you are effectively 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 FPC or DPC is located
- The location on the FPC in which the PIC is installed
- The PIC or DPC port
- The interface's channel and logical unit numbers (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 is associated with and allowed to run over the logical interface.

The following protocol families are supported:

- Internet Protocol version 4 (IPv4) suite (inet)
- Internet Protocol version 6 (IPv6) suite (inet6)
- Circuit cross-connect (CCC)
- Translational cross-connect (TCC)
- International Organization for Standardization (ISO)
- Multilink Frame Relay end-to-end (MLFR end-to-end)
- Multilink Frame Relay user-to-network interface network-to-network interface (MLFR UNI NNI)
- Multilink Point-to-Point Protocol (MLPPP)
- Multiprotocol Label Switching (MPLS)
- Trivial Network Protocol (TNP)
- (M Series, T Series, and MX Series routers only) Virtual private LAN service (VPLS)

Finally, 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:

- You configure the physical interface descriptor by including the **interfaces** *interface-name* statement.
- You configure the logical interface descriptor by including the **unit** statement within the **interfaces** *interface-name* statement or by including the **.logical** descriptor at the end of the interface name, as in **t3-0/0/0.1**, where the logical unit number is 1, as shown in the following examples:

```
[edit]
user@host# set interfaces t3-0/0/0 unit 1
[edit]
user@host# edit interfaces t3-0/0/0.1
[edit interfaces t3-0/0/0]
user@host# set unit 1
```

- You configure the family descriptor by including the **family** statement within the **unit** statement.
- You configure address entries by including the **address** statement within the **family** statement.
- You configure tunnels by including the **tunnel** statement within the **unit** statement.



NOTE: The address of a logical interface cannot be the same as a tunnel interface's source or destination address. If you try to configure a logical interface with a tunnel interface's address or vice versa, a commit failure will occur.

**Related
Documentation**

- Router Interfaces Overview on page 28

Interface Naming Overview

Each interface has an interface name, which specifies the media type, the slot in which the FPC or DPC is located, the location on the FPC where the PIC is installed, and the PIC or DPC 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 channel part, and a logical 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 interfaces.

The following sections provide interface naming configuration guidelines:

- Physical Part of an Interface Name on page 49
- Logical Part of an Interface Name on page 53
- Separators in an Interface Name on page 53
- Channel Part of an Interface Name on page 54
- Interface Naming for a Routing Matrix Based on a TX Matrix Router on page 54
- Interface Naming for a Routing Matrix Based on a TX Matrix Plus Router on page 56
- Chassis Interface Naming on page 59
- Examples: Interface Naming on page 59

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 where it can be one of the following:

- **ae**—Aggregated Ethernet interface. This is a virtual aggregated link and has a different naming format from most PICs; for more information, see Aggregated Ethernet Interfaces Overview.
- **as**—Aggregated SONET/SDH interface. This is a virtual aggregated link and has a different naming format from most PICs; for more information, see Configuring Aggregated SONET/SDH Interfaces.
- **at**—ATM1 or ATM2 intelligent queuing (IQ) interface or a virtual ATM interface on a Circuit Emulation (CE) interface.
- **bcm**—Gigabit Ethernet internal interface
- **br**—Integrated Services Digital Network (ISDN) interface (configured on a 1-port or 4-port Basic Rate Interface (BRI) card). This interface has a different naming format from most PICs: **br-pim/O/port**. The second number is always 0. For more information, see Configuring ISDN Physical Interface Properties.
- **cau4**—Channelized AU-4 IQ interface (configured on the Channelized STM1 IQ or IQE PIC or Channelized OC12 IQ and IQE PICs).
- **ce1**—Channelized E1 IQ interface (configured on the Channelized E1 IQ PIC or Channelized STM1 IQ or IQE PIC).
- **ci**—Container interface.
- **coc1**—Channelized OC1 IQ interface (configured on the Channelized OC12 IQ and IQE or Channelized OC3 IQ and IQE PICs).
- **coc3**—Channelized OC3 IQ interface (configured on the Channelized OC3 IQ and IQE PICs).

- **coc12**—Channelized OC12 IQ interface (configured on the Channelized OC12 IQ and IQE PICs).
- **coc48**—Channelized OC48 interface (configured on the Channelized OC48 and Channelized OC48 IQE PICs).
- **cp**—Collector interface (configured on the Monitoring Services II PIC).
- **cstm1**—Channelized STM1 IQ interface (configured on the Channelized STM1 IQ or IQE PIC).
- **cstm4**—Channelized STM4 IQ interface (configured on the Channelized OC12 IQ and IQE PICs).
- **cstm16**—Channelized STM16 IQ interface (configured on the Channelized OC48/STM16 and Channelized OC48/STM16 IQE PICs).
- **ct1**—Channelized T1 IQ interface (configured on the Channelized DS3 IQ and IQE PICs, Channelized OC3 IQ and IQE PICs, Channelized OC12 IQ and IQE PICs, or Channelized T1 IQ PIC).
- **ct3**—Channelized T3 IQ interface (configured on the Channelized DS3 IQ and IQE PICs, Channelized OC3 IQ and IQE PICs, or Channelized OC12 IQ and IQE PICs).
- **demux**—Interface that supports logical IP interfaces that use the IP source or destination address to demultiplex received packets. Only one demux interface (**demux0**) exists per chassis. All demux logical interfaces must be associated with an underlying logical interface.
- **dfc**—Interface that supports dynamic flow capture processing on T Series or M320 routers containing one or more Monitoring Services III PICs. Dynamic flow capture enables you to capture packet flows on the basis of dynamic filtering criteria. Specifically, you can use this feature to forward passively monitored packet flows that match a particular filter list to one or more destinations using an on-demand control protocol.
- **ds**—DS0 interface (configured on the Multichannel DS3 PIC, Channelized E1 PIC, Channelized OC3 IQ and IQE PICs, Channelized OC12 IQ and IQE PICs, Channelized DS3 IQ and IQE PICs, Channelized E1 IQ PIC, Channelized STM1 IQ or IQE PIC, or Channelized T1 IQ).
- **dsc**—Discard interface.
- **e1**—E1 interface (including channelized STM1-to-E1 interfaces).
- **e3**—E3 interface (including E3 IQ interfaces).
- **em**—Management and internal Ethernet interfaces for RE2600 and RE1800 Routing Engines. The Junos OS automatically configures the router's management interface, **em0**, which is an out-of-band management interface, and the internal Ethernet interface **em1**, which connects the Routing Engine with the router's packet-forwarding components. If the router has redundant Routing Engines, the Junos OS configures another internal Ethernet interface, **em2**, on each Routing Engine (**re0** and **re1**) in order to support fault tolerance. Two physical links between **re0** and **re1** connect the independent control planes. If one of the links fails, both Routing Engines can use the other link for IP communication.

- **es**—Encryption interface.
- **et**—100-Gigabit Ethernet interface.
- **fe**—Fast Ethernet interface.
- **fxp**—Management and internal Ethernet interfaces for all Routing Engines except RE2600 and RE1800 Routing Engines. The Junos OS automatically configures the router's management Ethernet interface, **fxp0**, which is an out-of-band management interface, and the internal Ethernet interface, **fxp1**, which connects the Routing Engine with the router's packet-forwarding components. If the router has redundant Routing Engines, another internal Ethernet interface, **fxp2**, is created on each Routing Engine (**re0** and **re1**) in order to support fault tolerance. Two physical links between **re0** and **re1** connect the independent control planes. If one of the links fails, both Routing Engines can use the other link for IP communication.
- **ge**—Gigabit Ethernet interface. Some older 10-Gigabit Ethernet interfaces use the **ge** media type to identify the physical part of the network device, but newer 10-Gigabit Ethernet interfaces use the **xe** media type.
- **gr**—Generic routing encapsulation (GRE) tunnel interface.
- **gre**—Internally generated interface that is configurable only as the control channel for Generalized MPLS (GMPLS). For more information about GMPLS, see the [Junos OS MPLS Applications Configuration Guide](#) and the [Junos OS Feature Guides](#).
- **ip**—IP-over-IP encapsulation tunnel interface.
- **ipip**—Internally generated interface that is not configurable.
- **ixgbe**—10-Gigabit Ethernet internal interface
- **iw**—Logical interfaces associated with the endpoints of Layer 2 circuit and Layer 2 VPN connections (pseudowire stitching for Layer 2 VPNs). For more information about VPNs, see the [Junos OS VPNs Configuration Guide](#).
- **lc**—Internally generated interface that is not configurable.
- **lo**—Loopback interface. The Junos OS automatically configures one loopback interface (**lo0**). The logical interface **lo0.16383** is a nonconfigurable interface for router control traffic.
- **ls**—Link services interface.
- **lsi**—Internally generated interface that is not configurable.
- **ml**—Multilink interface (including Multilink Frame Relay and MLPPP).
- **mo**—Monitoring services interface (including monitoring services and monitoring services II). The logical interface **mo-fpc/pic/port.16383** is an internally generated, nonconfigurable interface for router control traffic.
- **ms**—MultiServices interface.
- **mt**—Multicast tunnel interface (internal router interface for VPNs). If your router has a Tunnel PIC, the Junos OS automatically configures one multicast tunnel interface (**mt**) for each virtual private network (VPN) you configure. Although it is not necessary to configure multicast interfaces, you can use the **multicast-only** statement to configure

the unit and family so that the tunnel can transmit and receive multicast traffic only. For more information, see **multicast-only**.

- **mtun**—Internally generated interface that is not configurable.
- **oc3**—OC3 IQ interface (configured on the Channelized OC12 IQ and IQE PICs or Channelized OC3 IQ and IQE PICs).
- **pd**—Interface on the rendezvous point (RP) that de-encapsulates packets.
- **pe**—Interface on the first-hop RP that encapsulates packets destined for the RP router.
- **pimd**—Internally generated interface that is not configurable.
- **pime**—Internally generated interface that is not configurable.
- **rlsq**—Container interface, numbered from 0 through 127, used to tie the primary and secondary LSQ PICs together in high availability configurations. Any failure of the primary PIC results in a switch to the secondary PIC and vice versa.
- **rms**—Redundant interface for two MultiServices interfaces.
- **rsp**—Redundant virtual interface for the adaptive services interface.
- **se**—Serial interface (including EIA-530, V.35, and X.21 interfaces).
- **so**—SONET/SDH interface.
- **sp**—Adaptive services interface. The logical interface **sp-fpc/pic/port.16383** is an internally generated, nonconfigurable interface for router control traffic.
- **stm1**—STM1 interface (configured on the OC3/STM1 interfaces).
- **stm4**—STM4 interface (configured on the OC12/STM4 interfaces).
- **stm16**—STM16 interface (configured on the OC48/STM16 interfaces).
- **t1**—T1 interface (including channelized DS3-to-DS1 interfaces).
- **t3**—T3 interface (including channelized OC12-to-DS3 interfaces).
- **tap**—Internally generated interface that is not configurable.
- **umd**—USB modem interface.
- **vsp**—Voice services interface.
- **vc4**—Virtually concatenated interface.
- **vt**—Virtual loopback tunnel interface.
- **xe**—10-Gigabit Ethernet interface. Some older 10-Gigabit Ethernet interfaces use the **ge** media type (rather than **xe**) to identify the physical part of the network device.
- **xt**—Logical interface for Protected System Domains to establish a Layer 2 tunnel connection.

fpc identifies the number of the FPC or DPC card on which the physical interface is located. Specifically, it is the number of the slot in which the card is installed.

M40, M40e, M160, M320, M120, T320, T640, and T1600 routers each have eight FPC slots that are numbered 0 through 7, from left to right as you are facing the front of the

chassis. For information about compatible FPCs and PICs, see the *Hardware Guide* for your router.

The M20 router has four FPC slots that are numbered 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.

MX Series routers support DPCs, FPCs, and Modular Interface Cards (MICs). For information about compatible DPCs, FPCs, PICs, and MICs, see the *MX Series 3D Universal Edge Routers Line Card Guide*.

For M5, M7i, M10, and M10i routers, the FPCs are built into the chassis; you install the PICs into the chassis.

The M5 and M7i routers have space for up to four PICs. The M7i router also comes with an integrated Tunnel PIC, or an optional integrated AS PIC, or an optional integrated MS PIC.

The M10 and M10i routers have space for up to eight PICs.

A routing matrix can have up to 32 FPCs (numbered 0 through 31).

For more information about interface naming for a routing matrix, see “Interface Naming for a Routing Matrix Based on a TX Matrix Router” on page 54.

pic identifies the number of the PIC on which the physical interface is located. Specifically, it is the number of the PIC location on the FPC. FPCs with four PIC slots are numbered 0 through 3. FPCs with three PIC slots are numbered 0 through 2. The PIC location is printed on the FPC carrier board. For PICs that occupy more than one PIC slot, the lower PIC slot number identifies the PIC location.

port identifies a specific port on a PIC or DPC. The number of ports varies depending on the PIC. The port 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 from 0 through 16,385, for all interface types but demux and PPPoE. For these two interface types only, the range is 0 through 65,535.

Separators in an Interface Name

There is a separator 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.

Channel Part of an Interface Name

The channel identifier part of the interface name is required only on channelized interfaces. For channelized interfaces, channel 0 identifies the first channelized interface. For channelized IQ and channelized IQE interfaces, channel 1 identifies the first channelized interface. A nonconcatenated (that is, channelized) SONET/SDH OC48 interface has four OC12 channels, numbered 0 through 3.

To determine which types of channelized PICs are currently installed in the router, use the **show chassis hardware** command from the top level of the command-line interface (CLI). Channelized IQ and IQE PICs are listed in the output with “intelligent queuing IQ” or “enhanced intelligent queuing IQE” in the description. For more information, see Channelized Interfaces Overview.

For ISDN interfaces, you specify the B-channel in the form **bc-pim/0/port:n.n** is the B-channel ID and can be 1 or 2. You specify the D-channel in the form **dc-pim/0/port:0**.



NOTE: For ISDN, the B-channel and D-channel interfaces do not have any configurable parameters. However, when interface statistics are displayed, B-channel and D-channel interfaces have statistical values.



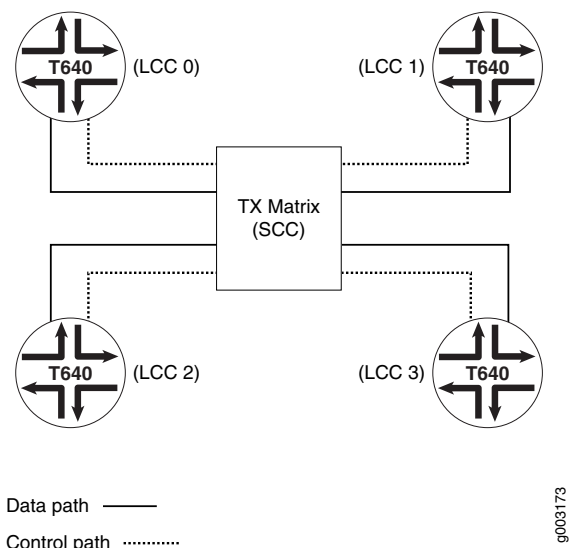
NOTE: In the Junos OS implementation, the term *logical interfaces* generally refers to interfaces you configure by including the unit statement at the [edit interfaces *interface-name*] hierarchy level. Logical interfaces have the *.logical* descriptor at the end of the interface name, as in **ge-0/0/0.1** or **t1-0/0/0:0.1**, where the logical unit number is 1.

Although channelized interfaces are generally thought of as logical or virtual, the Junos OS sees T3, T1, and NxDS0 interfaces within a channelized IQ or IQE PIC as physical interfaces. For example, both **t3-0/0/0** and **t3-0/0/0:1** are treated as physical interfaces by the Junos OS. In contrast, **t3-0/0/0.2** and **t3-0/0/0:1.2** are considered logical interfaces because they have the **.2** at the end of the interface names.

Interface Naming for a Routing Matrix Based on a TX Matrix Router

A routing matrix based on a Juniper Networks TX Matrix Router is a multichassis architecture composed of one TX Matrix router and from one to four interconnected T640 routers. From the perspective of the user interface, the routing matrix appears as a single router. The TX Matrix router controls all the T640 routers, as shown in Figure 3 on page 55.

Figure 3: Routing Matrix



A TX Matrix router is also referred to as a *switch-card chassis* (SCC). The CLI uses **scc** to refer to the TX Matrix router. A T640 router in a routing matrix is also referred to as a *line-card chassis* (LCC). The CLI uses **lcc** as a prefix to refer to a specific T640 router.

LCCs are assigned numbers, 0 through 3, depending on the hardware setup and connectivity to the TX Matrix router. For more information, see the [TX Matrix Router Hardware Guide](#). A routing matrix can have up to four T640 routers, and each T640 router has up to eight FPCs. Therefore, the routing matrix as a whole can have up to 32 FPCs (0 through 31).

In the Junos OS CLI, an interface name has the following format:

type-fpc/pic/port

When you specify the **fpc** number for a T640 router in a routing matrix, the Junos OS determines which T640 router contains the specified FPC based on the following assignment:

- On LCC 0, FPC hardware slots 0 through 7 are configured as 0 through 7.
- On LCC 1, FPC hardware slots 0 through 7 are configured as 8 through 15.
- On LCC 2, FPC hardware slots 0 through 7 are configured as 16 through 23.
- On LCC 3, FPC hardware slots 0 through 7 are configured as 24 through 31.

For example, the 1 in **se-1/0/0** refers to FPC hardware slot 1 on the T640 router labeled **lcc0**. The 11 in **t1-11/2/0** refers to FPC hardware slot 3 on the T640 router labeled **lcc1**. The 20 in **so-20/0/1** refers to FPC hardware slot 4 on the T640 router labeled **lcc2**. The 31 in **t3-31/1/0** refers to FPC hardware slot 7 on the T640 router labeled **lcc3**.

Table 4 on page 56 summarizes the FPC numbering for a T640 router in a routing matrix.

Table 4: FPC Numbering for T640 Routers in a Routing Matrix

LCC Numbers Assigned to the T640 Router	Configuration Numbers
0	0 through 7
1	8 through 15
2	16 through 23
3	24 through 31

Table 5 on page 56 lists each FPC hardware slot and the corresponding configuration numbers for LCCs 0 through 3.

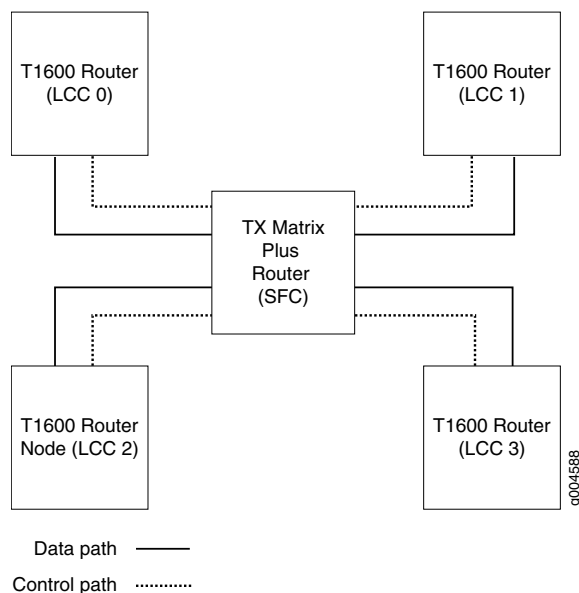
Table 5: One-to-One FPC Numbering for T640 Routers in a Routing Matrix

FPC Numbering	T640 Routers							
LCC 0								
Hardware Slots	0	1	2	3	4	5	6	7
Configuration Numbers	0	1	2	3	4	5	6	7
LCC 1								
Hardware Slots	0	1	2	3	4	5	6	7
Configuration Numbers	8	9	10	11	12	13	14	15
LCC 2								
Hardware Slots	0	1	2	3	4	5	6	7
Configuration Numbers	16	17	18	19	20	21	22	23
LCC 3								
Hardware Slots	0	1	2	3	4	5	6	7
Configuration Numbers	24	25	26	27	28	29	30	31

Interface Naming for a Routing Matrix Based on a TX Matrix Plus Router

A routing matrix based on a Juniper Networks TX Matrix Plus Router is a multichassis architecture composed of one TX Matrix Plus router and from one to four interconnected T1600 routers. From the perspective of the user interface, the routing matrix appears as a single router. The TX Matrix Plus router controls all the T1600 routers, as shown in Figure 4 on page 57.

Figure 4: Routing Matrix Based on a TX Matrix Plus Router



A TX Matrix Plus router is also referred to as a *switch-fabric chassis* (SFC). The CLI uses **sfc** to refer to the TX Matrix Plus router. A T1600 router in a routing matrix is also referred to as a *line-card chassis* (LCC). The CLI uses **lcc** as a prefix to refer to a specific T1600 router.

LCCs are assigned numbers, 0 through 3, depending on the hardware setup and connectivity to the TX Matrix Plus router. For more information, see the *TX Matrix Plus Router Hardware Guide*. A routing matrix based on a TX Matrix Plus router can have up to four T1600 routers, and each T1600 router has up to eight FPCs. Therefore, the routing matrix as a whole can have up to 32 FPCs (0 through 31).

In the Junos OS CLI, an interface name has the following format:

type-fpc/pic/port

When you specify the **fpc** number for a T1600 router in a routing matrix, the Junos OS determines which T1600 router contains the specified FPC based on the following assignment:

- On LCC 0, FPC hardware slots 0 through 7 are configured as 0 through 7.
- On LCC 1, FPC hardware slots 0 through 7 are configured as 8 through 15.
- On LCC 2, FPC hardware slots 0 through 7 are configured as 16 through 23.
- On LCC 3, FPC hardware slots 0 through 7 are configured as 24 through 31.

For example, the 1 in **se-1/0/0** refers to FPC hardware slot 1 on the T1600 router labeled **lcc0**. The 11 in **t1-11/2/0** refers to FPC hardware slot 3 on the T1600 router labeled **lcc1**. The 20 in **so-20/0/1** refers to FPC hardware slot 4 on the T1600 router labeled **lcc2**. The 31 in **t3-31/1/0** refers to FPC hardware slot 7 on the T1600 router labeled **lcc3**.

Table 6 on page 58 summarizes the FPC numbering for a routing matrix based on a TX Matrix Plus router.

Table 6: FPC Numbering for T1600 Routers in a Routing Matrix

LCC Numbers Assigned to the T1600 Router	Configuration Numbers
0	0 through 7
1	8 through 15
2	16 through 23
3	24 through 31

Table 7 on page 58 lists each FPC hardware slot and the corresponding configuration numbers for LCCs 0 through 3.

Table 7: One-to-One FPC Numbering for T1600 Routers in a Routing Matrix

FPC Numbering	T1600 Routers							
LCC 0								
Hardware Slots	0	1	2	3	4	5	6	7
Configuration Numbers	0	1	2	3	4	5	6	7
LCC 1								
Hardware Slots	0	1	2	3	4	5	6	7
Configuration Numbers	8	9	10	11	12	13	14	15
LCC 2								
Hardware Slots	0	1	2	3	4	5	6	7
Configuration Numbers	16	17	18	19	20	21	22	23
LCC 3								
Hardware Slots	0	1	2	3	4	5	6	7
Configuration Numbers	24	25	26	27	28	29	30	31

Chassis Interface Naming

You configure some PIC properties, such as framing, at the **[edit chassis]** hierarchy level. Chassis interface naming varies depending on the routing hardware.

- To configure PIC properties for a standalone router, you must specify the FPC and PIC numbers, as follows:

```
[edit chassis]
fpc slot-number {
  pic pic-number {
    ...
  }
}
```

- To configure PIC properties for a T640 or T1600 router configured in a routing matrix, you must specify the LCC, FPC, and PIC numbers, as follows:

```
[edit chassis]
lcc lcc-number {
  fpc slot-number { # Use the hardware FPC slot number
    pic pic-number {
      ...
    }
  }
}
```

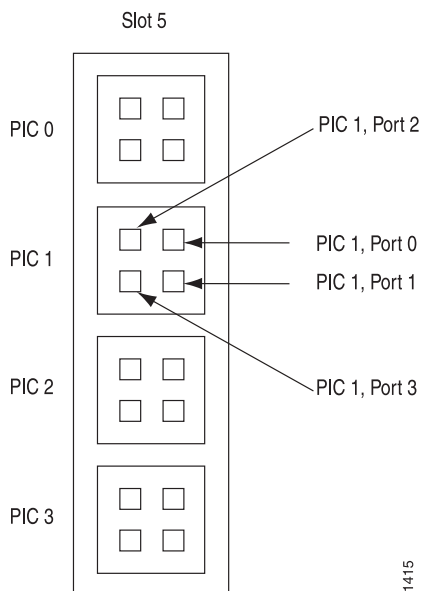
For the FPC slot in a T640 router in a routing matrix, specify the actual hardware slot number, as labeled on the T640 router chassis. Do not use the corresponding software FPC configuration numbers shown in Table 5 on page 56.

For the FPC slot in a T1600 router in a routing matrix, specify the actual hardware slot number, as labeled on the T1600 router chassis. Do not use the corresponding software FPC configuration numbers shown in Table 6 on page 58.

For more information about the **[edit chassis]** hierarchy, see the *Junos OS System Basics Configuration Guide*.

Examples: Interface Naming

This section provides examples of naming interfaces. For an illustration of where slots, PICs, and ports are located, see Figure 5 on page 60.

Figure 5: Interface Slot, PIC, and Port Locations

For an FPC in slot 1 with two OC3 SONET/SDH 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/SDH PIC 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, it has the following name:

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

An OC48 SONET/SDH PIC 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

In a routing matrix on the T640 router labeled **lcc1**, for an FPC in slot 5 with four SONET OC192 PICs, the four PICs, each with a single port and a single logical unit, have the following names:

so-13/0/0.0

so-13/1/0.0

so-13/2/0.0

so-13/3/0.0

For an FPC in slot 1 with one 4-port BRI interface card, port 4 has the following name:

br-1/0/4

The first B channel, the second B channel, and the control channel have the following names:

bc-1/0/4:1

bc-1/0/4:2

dc-1/0/4:0

Related Documentation

- Router Interfaces Overview on page 28

Displaying Interface Configurations Overview

To display a configuration, use either the **show** command in configuration mode or the **show configuration** top-level command. Interfaces are listed in numerical order, from lowest to highest slot number, then from lowest to highest PIC number, and finally from lowest to highest port number.

Related Documentation

- Router Interfaces Overview on page 28

Synchronous Ethernet Overview

Synchronization is a key requirement for circuit (emulation) services and mobile radio access technologies. Traditionally, mobile networks utilized SONET/SDH technologies to backhaul voice and data traffic, and used the native support for frequency of SONET/SDH to synchronize their radio network. With the need for greater-capacity backhaul networks, packet-based technologies such as Carrier Ethernet (which do not support the transfer of frequency), and wireless technologies such as frequency division duplex and time division duplex require not only frequency synchronization but also proper time and phase alignment. This requirement is fulfilled by synchronous Ethernet, which is used for physical layer frequency synchronization of connected access devices (such as base stations, access nodes, and so on). Synchronous Ethernet supports sourcing and transfer of frequency for synchronization purposes for both wireless and wireline services and is primarily used for mobile backhaul and converged transport.

Synchronous Ethernet (ITU-T G.8261) is a physical layer–based technology that functions regardless of the network load. Synchronous Ethernet supports hop-by-hop frequency transfer, where all interfaces on the trail must support synchronous Ethernet.

Starting with Junos OS Release 10.4, synchronous Ethernet is supported on MX Series 3D Universal Edge Routers, which deliver synchronization services that meet the requirements of the present-day mobile network, as well as future Long Term Evolution (LTE)–based infrastructures. Support for synchronous Ethernet is now extended to the 16-Port 10-Gigabit Ethernet MPC (also called the 10-Gigabit Ethernet MPC with SFP+ or the 16x10GE MPC).

From Junos OS Release 11.1, the 16x10GE MPC supports ingress clock monitoring. The 16x10GE MPC does not have a built-in Ethernet equipment clock. Therefore, the 16x10GE MPC can only input a clock signal but cannot be sourced as a clock source. Therefore, the incoming synchronous Ethernet signals cannot be monitored on the 16x10GE MPC but are monitored by other line cards in the chassis, such as Modular Port Concentrators (MPCs). You can use the 16x10GE MPC for incoming synchronous Ethernet signals, if at least one other MPC with an Ethernet equipment clock is present in the chassis. This behavior is termed as ingress clock monitoring. Ingress clock monitoring is supported on MX series routers (excluding MX80 routers, because MX80 routers do not have the 16x10GE MPC).

When an MX Series router is configured for synchronous Ethernet on the 16x10GE MPC and no other MPC with an Ethernet equipment clock is present in the chassis, the synchronous Ethernet feature cannot be supported by the system. The system notifies the user through log messages and CLI output and justifies its inability to support synchronous Ethernet.



NOTE: Currently, MX Series routers with 10-Gigabit Ethernet MICs or 10-Gigabit Ethernet built-in interfaces do not support synchronous Ethernet or Ethernet synchronization messaging channel (ESMC) transmit in LAN physical layer device (LAN PHY) framing mode. Therefore, if you need to configure synchronous Ethernet or ESMC transmit interfaces on MX Series routers with 10-Gigabit Ethernet Interfaces, then you must configure all the 10-Gigabit Ethernet interfaces on the MIC in WAN physical layer device (WAN PHY) framing mode.

Related Documentation

- Router Interfaces Overview on page 28
- Interface and Router Clock Sources Overview on page 63

Interface and Router Clock Sources Overview

- Interface and Router Clock Sources Description on page 63
- Configuring an External Synchronization Interface on page 64

Interface and Router Clock Sources Description

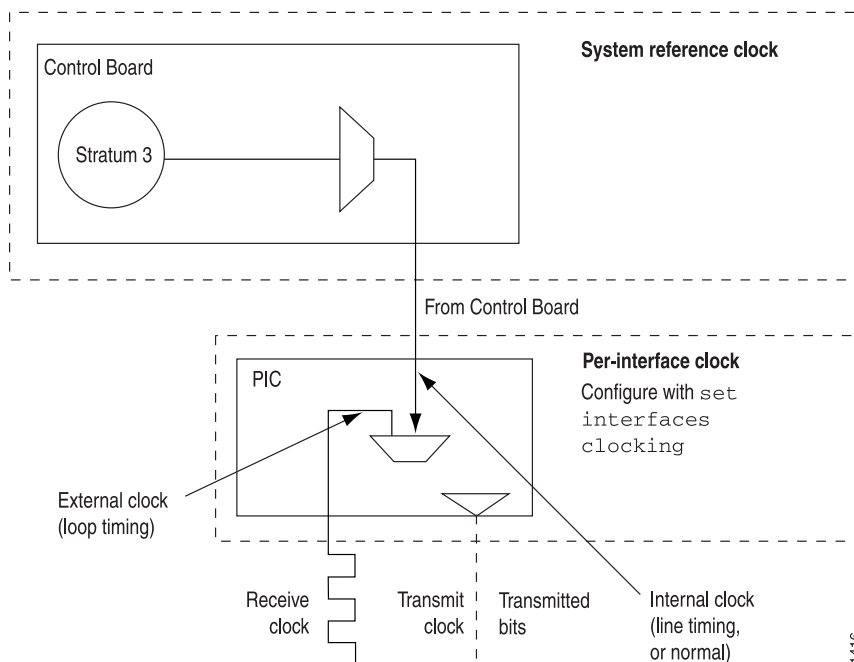
When configuring the router, you can configure the *transmit clock* on each interface; the transmit clock aligns each outgoing packet transmitted over the router's interfaces. For both the router and interfaces, the clock source can be the router's internal Stratum 3 clock, which resides on the control board, 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 6 on page 64 illustrates the different clock sources.

Figure 6: Clock Sources



Configuring an External Synchronization Interface

The M Series 320 router supports an external synchronization interface that can be configured to synchronize the internal Stratum 3 clock to an external source, and then synchronize the chassis interface clock to the external source.

This feature can be configured for external primary and secondary interfaces that use Building Integrated Timing System (BITS) or SDH Equipment Timing Source (SETS) timing sources. When internal timing is set for SONET/SDH, Plesiochronous Digital Hierarchy (PDH), and digital hierarchy (DS1) interfaces on the Physical Interface Cards (PICs), the transmit clock of the interface is synchronized to BITS/SETS timing and traceable to timing within the network.

To configure external synchronization on the M Series 320 router, include the **synchronization** statement at the **[edit chassis]** hierarchy level.

For more information about the external synchronization interface, see the [Junos OS System Basics Configuration Guide](#).

Related Documentation

- Router Interfaces Overview on page 28

CHAPTER 3

Configuring Physical Interface Properties

- Physical Interface Configuration Statements Overview on page 66
- Physical Interfaces Properties Statements List on page 75
- Interface Ranges on page 92
- Specifying an Aggregated Interface on page 101
- Specifying a USB Modem Interface on J Series Routers on page 102
- Specifying OC768-over-OC192 Mode on page 103
- Adding an Interface Description to the Configuration on page 104
- Configuring the Link Characteristics on page 106
- Configuring the Media MTU on page 106
- Configuring Interface Encapsulation on Physical Interfaces on page 116
- Configuring the PPP Challenge Handshake Authentication Protocol on page 121
- Configuring the PPP Password Authentication Protocol on page 124
- Monitoring a PPP Session on page 128
- Tracing Operations of the pppd Process on page 128
- Configuring PPP Address and Control Field Compression on page 129
- Configuring the PPP Protocol Field Compression on page 130
- Configuring the Interface Speed on page 132
- Configuring Keepalives on page 136
- Configuring the Clock Source on page 137
- Configuring the Router as a DCE on page 137
- Configuring Receive and Transmit Leaky Bucket Properties on page 138
- Configuring Accounting for the Physical Interface on page 139
- Interface Diagnostics on page 140
- Tracing Operations of an Individual Router Interface on page 146
- Damping Interface Transitions on page 147
- Configuring Multiservice Physical Interface Properties on page 147
- Enabling or Disabling SNMP Notifications on Physical Interfaces on page 148

- Enabling Unidirectional Traffic Flow on Physical Interfaces on page 148
- Disabling a Physical Interface on page 149

Physical Interface Configuration Statements Overview

The software driver for each network media type sets reasonable default values for general interface properties, such as the interface's maximum transmission unit (MTU) size, receive and transmit leaky bucket properties, link operational mode, and clock source.

M Series, MX Series, T Series, and J Series routers are factory configured according to the specific router, its features, and its physical interfaces. This section includes a default configuration example showing the statements used to configure the physical interfaces properties. Additional statements are used to set properties for specific interface types and are described in "Physical Interfaces Properties Statements List" on page 75.

To modify any of the default general interface properties, include the appropriate statements at the **[edit interfaces *interface-name*]** hierarchy level:



NOTE: The following configuration hierarchy and its included statements are shown only as an example of a configuration statement hierarchy and should not be referenced for resolving actual configurations. For information on a specific hierarchy level, see the hierarchy level document for that specific hierarchy, for example "[edit interfaces] Hierarchy Level" on page 4.

```
interfaces {
  traceoptions {
    file filename <files number> <match regular-expression> <size size> <world-readable |
      no-world-readable>;
    flag flag <disable>;
  }
  interface-name {
    accounting-profile name;
    aggregated-ether-options {
      (flow-control | no-flow-control);
      lacp {
        (active | passive);
        link-protection {
          disable;
          (revertive | non-revertive);
          periodic interval;
          system-priority priority;
        }
      }
      link-protection;
      link-speed speed;
      (loopback | no-loopback);
      minimum-links number;
      source-address-filter {
        mac-address
      }
      (source-filtering | no-source-filtering);
    }
    aggregated-sonet-options {
```



```

    link-speed speed | mixed;
    minimum-links number;
}
atm-options {
    cell-bundle-size cells;
    ilmi;
    linear-red-profiles profile-name {
        high-plp-max-threshold percent;
        low-plp-max-threshold percent;
        queue-depth cells high-plp-threshold percent low-plp-threshold percent;
    }
    mpls {
        pop-all-labels {
            required-depth number;
        }
    }
    pic-type (atm1 | atm2);
    plp-to-clp;
    promiscuous-mode {
        vpi vpi-identifier;
    }
    scheduler-maps map-name {
        forwarding-class class-name {
            epd-threshold cells plp1 cells;
            linear-red-profile profile-name;
            priority (high | low);
            transmit-weight (cells number | percent number);
        }
        vc-cos-mode (alternate | strict);
    }
    vpi vpi-identifier {
        maximum-vcs maximum-vcs;
        oam-liveness {
            up-count cells;
            down-count cells;
        }
        oam-period (seconds | disable);
        shaping {
            (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst length);
            queue-length number;
        }
    }
}
clocking clock-source;
data-input (system | interface interface-name);
dce;
serial-options {
    clock-rate rate;
    clocking-mode (dce | internal | loop);
    control-polarity (negative | positive);
    cts-polarity (negative | positive);
    dcd-polarity (negative | positive);
    dce-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
    }
}

```

```
dcd (ignore | normal | require);
dsr (ignore | normal | require);
dtr signal-handling-option;
ignore-all;
indication (ignore | normal | require);
rts (assert | de-assert | normal);
tm (ignore | normal | require);
}
dsr-polarity (negative | positive);
dte-options {
  control-signal (assert | de-assert | normal);
  cts (ignore | normal | require);
  dcd (ignore | normal | require);
  dsr (ignore | normal | require);
  dtr signal-handling-option;
  ignore-all;
  indication (ignore | normal | require);
  rts (assert | de-assert | normal);
  tm (ignore | normal | require);
}
dtr-circuit (balanced | unbalanced);
dtr-polarity (negative | positive);
encoding (nrz | nrzi);
indication-polarity (negative | positive);
line-protocol protocol;
loopback mode;
rts-polarity (negative | positive);
tm-polarity (negative | positive);
transmit-clock invert;
}
description text;
dialer-options {
  pool pool-name <priority priority>;
}
disable;
ds0-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  byte-encoding (nx56 | nx64);
  fcs (16 | 32);
  idle-cycle-flag (flags | ones);
  invert-data;
  loopback payload;
  start-end-flag (filler | shared);
}
e1-options {
  bert-error-rate rate;
  bert-period seconds;
  fcs (16 | 32);
  framing (g704 | g704-no-crc4 | unframed);
  idle-cycle-flag (flags | ones);
  invert-data;
  loopback (local | remote);
  start-end-flag (filler | shared);
  timeslots time-slot-range;
```

```

}
e3-options {
  atm-encapsulation (direct | plcp);
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  buildout feet;
  compatibility-mode (digital-link | kentrox | larscom) <subrate value>;
  fcs (16 | 32);
  framing (g.751 | g.832);
  idle-cycle-flag (filler | shared);
  invert-data;
  loopback (local | remote);
  (payload-scrambler | no-payload-scrambler);
  start-end-flag (filler | shared);
  (unframed | no-unframed);
}
encapsulation type;
es-options {
  backup-interface es-fpc/pic/port;
}
fastether-options {
  802.3ad aex;
  (flow-control | no-flow-control);
  ignore-l3-incompletes;
  ingress-rate-limit rate;
  (loopback | no-loopback);
  mpls {
    pop-all-labels {
      required-depth number;
    }
  }
  source-address-filter {
    mac-address;
  }
  (source-filtering | no-source-filtering);
}
flexible-vlan-tagging;
gigether-options {
  802.3ad aex;
  (asynchronous-notification | no-asynchronous-notification);
  (auto-negotiation | no-auto-negotiation) remote-fault <local-interface-online |
    local-interface-offline>;
  auto-reconnect seconds;
  (flow-control | no-flow-control);
  ignore-l3-incompletes;
  (loopback | no-loopback);
  mpls {
    pop-all-labels {
      required-depth number;
    }
  }
  source-address-filter {
    mac-address;
  }
  (source-filtering | no-source-filtering);
}

```

```
ethernet-switch-profile {
  (mac-learn-enable | no-mac-learn-enable);
  tag-protocol-id [ tpids ];
  ethernet-policer-profile {
    input-priority-map {
      ieee802.1p premium [ values ];
    }
    output-priority-map {
      classifier {
        premium {
          forwarding-class class-name {
            loss-priority (high | low);
          }
        }
      }
    }
  }
  policer cos-policer-name {
    aggregate {
      bandwidth-limit bps;
      burst-size-limit bytes;
    }
    premium {
      bandwidth-limit bps;
      burst-size-limit bytes;
    }
  }
}

(gratuitous-arp-reply | no-gratuitous-arp-reply);
hold-time up milliseconds down milliseconds;
interface-set interface-set-name {
  interface ethernet-interface-name {
    (unit unit-number | vlan-tags-outer vlan-tag);
  }
}

isdn-options {
  bchannel-allocation (ascending | descending);
  calling-number number;
  pool pool-name <priority priority>;
  spid1 spid-string;
  spid2 spid-string;
  static-tei-val value;
  switch-type (att5e | etsi | nil | ntdms100 | ntt);
  t310 seconds;
  tei-option (first-call | power-up);
}

keepalives <down-count number> <interval seconds> <up-count number>;
link-mode mode;
lmi {
  lmi-type (ansi | itu);
  n391dte number;
  n392dce number;
  n392dte number;
  n393dce number;
  n393dte number;
```

```

    t391dte seconds;
    t392dce seconds;
}
lsq-failure-options {
    no-termination-request;
    [ trigger-link-failure interface-name ];
}
mac mac-address;
mlfr-uni-nni-bundle-options {
    acknowledge-retries number;
    acknowledge-timer milliseconds;
    action-red-differential-delay (disable-tx | remove-link);
    cisco-interoperability send-lip-remove-link-for-link-reject;
    drop-timeout milliseconds;
    fragment-threshold bytes;
    hello-timer milliseconds;
    link-layer-overhead percent;
    lmi-type (ansi | itu);
    minimum-links number;
    mrru bytes;
    n391 number;
    n392 number;
    n393 number;
    red-differential-delay milliseconds;
    t391 seconds;
    t392 seconds;
    yellow-differential-delay milliseconds;
    encapsulation type;
}
modem-options {
    dialin (console | routable);
    init-command-string initialization-command-string;
}
mtu bytes;
multiservice-options {
    (core-dump | no-core-dump);
    (syslog | no-syslog);
    (dump-on-flow-control);
    flow-control-options {
        down-on-flow-control;
        dump-on-flow-control;
        reset-on-flow-control;
    }
}
native-vlan-id number;
no-gratuitous-arp-request;
no-keepalives;
no-partition {
    interface-type type;
}
optics-options {
    wavelength nm;
    alarmalarm-name {
        (syslog | link-down);
    }
}
warningwarning-name {

```

```
        (syslog | link-down);
    }
}
partition partition-number oc-slice oc-slice-range interface-type type;
timeslots time-slot-range;
passive-monitor-mode;
per-unit-scheduler;
ppp-options {
    chap {
        access-profile name;
        default-chap-secret name;
        local-name name;
        passive;
    }
    compression {
        acfc;
        pfc;
    }
    dynamic-profile profile-name;
    no-termination-request;
    pap {
        access-profile name;
        local-name name;
        local-password password;
        passive;
    }
}
receive-bucket {
    overflow (discard | tag);
    rate percentage;
    threshold bytes;
}
redundancy-options {
    primary sp-fpc/pic/port;
    secondary sp-fpc/pic/port;
}
schedulers number;
serial-options {
    clock-rate rate;
    clocking-mode (dce | internal | loop);
    control-polarity (negative | positive);
    cts-polarity (negative | positive);
    dcd-polarity (negative | positive);
    dce-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
        dcd (ignore | normal | require);
        dsr (ignore | normal | require);
        dtr signal-handling-option;
        ignore-all;
        indication (ignore | normal | require);
        rts (assert | de-assert | normal);
        tm (ignore | normal | require);
    }
    dsr-polarity (negative | positive);
    dte-options {
```

```

control-signal (assert | de-assert | normal);
cts (ignore | normal | require);
dcd (ignore | normal | require);
dsr (ignore | normal | require);
dtr signal-handling-option;
ignore-all;
indication (ignore | normal | require);
rts (assert | de-assert | normal);
tm (ignore | normal | require);
}
dtr-circuit (balanced | unbalanced);
dtr-polarity (negative | positive);
encoding (nrz | nrzi);
indication-polarity (negative | positive);
line-protocol protocol;
loopbackmode;
rts-polarity (negative | positive);
tm-polarity (negative | positive);
transmit-clock invert;
}
services-options {
  inactivity-timeout seconds;
  open-timeout seconds;
  syslog {
    host hostname {
      facility-override facility-name;
      log-prefix prefix-number;
      services priority-level;
    }
  }
}
shdsl-options {
  annex (annex-a | annex-b);
  line-rate line-rate;
  loopback (local | remote);
  snr-margin {
    current margin;
    snext margin;
  }
}
sonet-options {
  aggregate asx;
  aps {
    advertise-interval milliseconds;
    authentication-key key;
    force;
    hold-time milliseconds;
    lockout;
    neighbor address;
    paired-group group-name;
    preserve-interface;
    protect-circuit group-name;
    request;
    revert-time seconds;
    switching-mode (bidirectional | unidirectional);
    working-circuit group-name;
  }
}

```

```
}
bytes {
  c2 value;
  e1-quiet value;
  f1 value;
  f2 value;
  s1 value;
  z3 value;
  z4 value;
}
fcs (16 | 32);
loopback (local | remote);
mpls {
  pop-all-labels {
    required-depth number;
  }
}
path-trace trace-string;
(payload-scrambler | no-payload-scrambler);
rfc-2615;
trigger {
  defect ignore;
  hold-time up milliseconds down milliseconds;
}
vtmapping (itu-t | klm);
(z0-increment | no-z0-increment);
}
(speed (10m | 100m | 1g | auto) | speed (auto | 1Gbps | 100Mbps | 10Mbps) | speed
(oc3 | oc12 | oc48));
stacked-vlan-tagging;
switch-options {
  switch-port port-number {
    (auto-negotiation | no-auto-negotiation);
    speed (10m | 100m | 1g);
    link-mode (full-duplex | half-duplex);
  }
}
multicast-statistics
t1-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  buildout value;
  byte-encoding (nx56 | nx64);
  crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);
  crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);
  fcs (16 | 32);
  framing (esf | sf);
  idle-cycle-flag (flags | ones);
  invert-data;
  line-encoding (ami | b8zs);
  loopback (local | payload | remote);
  remote-loopback-respond;
  start-end-flag (filler | shared);
  timeslots time-slot-range;
}
```



```

t3-options {
  atm-encapsulation (direct | plcp);
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  buildout feet;
  (cbit-parity | no-cbit-parity);
  compatibility-mode (adtran | digital-link | kentrox | larscom | verilink) <subrate
    value>;
  fcs (16 | 32);
  (feac-loop-respond | no-feac-loop-respond);
  idle-cycle-flag value;
  (long-buildout | no-long-buildout);
  (loop-timing | no-loop-timing);
  loopback (local | payload | remote);
  (mac | no-mac);
  (payload-scrambler | no-payload-scrambler);
  start-end-flag (filler | shared);
}
traceoptions {
  flag flag <flag-modifier> <disable>;
}
transmit-bucket {
  overflow discard;
  rate percentage;
  threshold bytes;
}
(traps | no-traps);
unidirectional;
vlan-tagging;
vlan-vci-tagging;
unit logical-unit-number {
  logical-interface-statements;
}
}
}

```

Related Documentation

- Router Interfaces Overview on page 28

Physical Interfaces Properties Statements List

Table 8 on page 75 lists statements that you can use to configure physical interfaces.

Table 8: Statements for Physical Interface Properties

Statement	Interface Types	Usage Guidelines
802.3ad <i>aex</i>	Aggregated Ethernet interfaces	Aggregated Ethernet Interfaces Overview
access-profile <i>name</i>	Interfaces with Point-to-Point Protocol (PPP) encapsulation	"Configuring the PPP Challenge Handshake Authentication Protocol" on page 121

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
accounting-profile <i>name</i>	All	"Configuring Accounting for the Physical Interface" on page 139
acfc	Interfaces with PPP encapsulation	Configuring PPPoE
acknowledge-retries <i>number</i>	Link services and voice services interfaces	Junos OS Services Interfaces Configuration Guide
acknowledge-timer <i>milliseconds</i>	Link services and voice services interfaces	Junos OS Services Interfaces Configuration Guide
action-red-differential-delay (<i>disable-tx remove-link</i>)	Link services and voice services interfaces	Junos OS Services Interfaces Configuration Guide
advertise-interval <i>milliseconds</i>	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties
aggregate	Gigabit Ethernet intelligent queuing (IQ and IQE) interfaces and Gigabit Ethernet interfaces with small form-factor pluggable transceivers (SFPs) (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router)	Configuring Gigabit Ethernet Policers
aggregate asx	Aggregated SONET/SDH interfaces	Configuring Aggregated SONET/SDH Interfaces
aggregated-ether-options	Aggregated Ethernet interfaces	Aggregated Ethernet Interfaces Overview
aggregate-ports	SONET/SDH interfaces	"Specifying OC768-over-OC192 Mode" on page 103
aggregated-sonet-options	Aggregated SONET/SDH interfaces	Configuring Aggregated SONET/SDH Interfaces
alarmalarm-name (<i>syslog link-down</i>)	10-Gigabit Ethernet interfaces	Configuring 10-Gigabit Ethernet Link Down Notification for Optics Options Alarm or Warning
annex (<i>annex-a annex-b</i>)	ATM interfaces on J Series routers SONET interfaces using annex-b for MSP switching on M320 and M120 Routers	Configuring SHDSL Operating Mode on an ATM Physical Interface Configuring APS and MSP
aps	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties
atm-encapsulation (<i>direct plcp</i>)	E3 and T3 traffic over Asynchronous Transfer Mode (ATM) interfaces	Configuring E3 and T3 Parameters on ATM Interfaces

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
atm-options	ATM1 and ATM2 IQ interfaces	"Interface Encapsulations Overview" on page 36
authentication-key <i>key</i>	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties
backup-interface	E1, E3, T1, T3 and Fast Ethernet	Configuring ISDN Logical Interface Properties
bandwidth-limit <i>bps</i>	Gigabit Ethernet and Gigabit Ethernet IQ and IQE PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router)	Configuring Gigabit Ethernet Policers
bchannel-allocation (ascending descending)	J Series routers equipped with a Dual-Port Channelized T1/E1 PIM; for Integrated Services Digital Network Primary Rate Interfaces (ISDN PRI)	Allocating B-Channels for Dialout
bert-algorithm <i>algorithm</i>	E3, T1, T3, multichannel DS3, channelized interfaces (DS3, OC12, and STM1), and channelized IQ and IQE interfaces (E1 and DS3)	"Interface Diagnostics" on page 143
bert-error-rate <i>rate</i>	E1, E3, T1, T3, and channelized interfaces (DS3, OC3, OC12, and STM1)	"Interface Diagnostics" on page 143
bert-period <i>seconds</i>	E1, E3, T1, T3, and channelized interfaces (DS3, OC12, and STM1)	"Interface Diagnostics" on page 143
Configuring the T1 Buildout <i>value</i>	T1 interfaces	Configuring the T1 Buildout
buildout <i>feet</i>	E3 and T3 traffic over ATM interfaces	Configuring E3 and T3 Parameters on ATM Interfaces
burst-size-limit <i>bytes</i>	Gigabit Ethernet and Gigabit Ethernet IQ and IQE PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router)	Configuring Gigabit Ethernet Policers
byte-encoding (nx56 nx64)	DS0 and T1 interfaces	Configuring T1 Byte Encoding
bytes [<i>values</i>	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties
cbit-parity no-cbit-parity	T3 interfaces	Disabling T3 C-Bit Parity Mode
cbr <i>rate</i>	ATM interfaces	Defining the ATM Traffic-Shaping Profile

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
cell-bundle-size <i>cells</i>	ATM2 IQ interfaces using ATM Layer 2 circuit cell-relay transport mode	Configuring the Layer 2 Circuit Cell-Relay Cell Maximum
chap	Interfaces with PPP encapsulation	"Configuring the PPP Challenge Handshake Authentication Protocol" on page 121
cisco-interoperability send-lip-remove-link-for-link-reject	link services IQ (lsq) interfaces	Junos OS Services Interfaces Configuration Guide
classifier	Gigabit Ethernet IQ interfaces	Configuring Gigabit Ethernet Policers
clocking <i>clock-source</i>	ATM, DS0, E1, E3, SONET/SDH, T1, and T3 interfaces	"Configuring the Clock Source" on page 137
clocking-mode (dce internal loop)	Serial interfaces (EIA-530 and V.35)	"Configuring the Serial Clocking Mode" on page 279
clock-rate <i>rate</i>	Serial interfaces (EIA-530 and V.35)	"Configuring the DTE Clock Rate" on page 280
compatibility-mode <i>mode</i>	E3 and T3 interfaces	Configuring the E3 CSU Compatibility Mode and Configuring the T3 CSU Compatibility Mode
compression	Interfaces with PPP encapsulation	"Configuring the PPP Protocol Field Compression" on page 130
control-polarity (negative positive)	Serial interfaces (X.21)	"Configuring Serial Signal Polarities" on page 284
control-signal (assert de-assert normal)	Serial interfaces (X.21)	"Configuring the Serial Signal Handling" on page 281
core-dump no-core-dump)	Adaptive services, monitoring services, and collector interfaces	"Configuring Multiservice Physical Interface Properties" on page 147
cts (ignore normal require)	Serial interfaces (EIA-530 and V.35)	"Configuring the Serial Signal Handling" on page 281
cts-polarity (negative positive)	Serial interfaces (EIA-530 and V.35)	"Configuring Serial Signal Polarities" on page 284
current <i>margin</i>	ATM interfaces on J Series routers	Configuring SHDSL Operating Mode on an ATM Physical Interface
dcd (ignore normal require)	Serial interfaces (EIA-530 and V.35)	"Configuring the Serial Signal Handling" on page 281

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
dcd-polarity (negative positive)	Serial interfaces (EIA-530 and V.35)	"Configuring Serial Signal Polarities" on page 284
dce	Interfaces with Frame Relay encapsulation	"Configuring the Router as a DCE" on page 137
dce-options	Serial interfaces (EIA-530, V.35, and X.21) on J Series routers	"Configuring the Serial Signal Handling" on page 281
default-chap-secret <i>name</i>	Interfaces with Point-to-Point Protocol (PPP) encapsulation	"Configuring a Default CHAP Secret" on page 123
description <i>text</i>	All	"Adding an Interface Description to the Configuration" on page 104
dialer-options	ISDN interfaces	Configuring ISDN Physical Interface Properties
disable	All	"Disabling a Physical Interface" on page 149 and "Tracing Operations of an Individual Router Interface" on page 146
dot1x	802.1x Port-Based Network Access Control	IEEE 802.1x Port-Based Network Access Control Overview
down-count	ATM interfaces	Configuring the ATM OAM F5 Loopback Cell Threshold
drop-timeout <i>milliseconds</i>	Multilink, link services, and voice services interfaces	Junos OS Services Interfaces Configuration Guide
ds0-options	DS0 interfaces	Channelized Interfaces Overview
dsr (ignore normal require)	Serial interfaces (EIA-530 and V.35)	"Configuring the Serial Signal Handling" on page 281
dsr-polarity (negative positive)	Serial interfaces (EIA-530 and V.35)	"Configuring Serial Signal Polarities" on page 284
dte-options	Serial interfaces (EIA-530, V.35, and X.21) on M Series and T Series routers	"Configuring the Serial Signal Handling" on page 281
dtr <i>signal-handling-option</i>	Serial interfaces (EIA-530 and V.35)	"Configuring the Serial Signal Handling" on page 281
dtr-circuit (balanced unbalanced)	Serial interfaces (EIA-530 and V.35)	"Configuring the Serial DTR Circuit" on page 284
dtr-polarity (negative positive)	Serial interfaces (EIA-530 and V.35)	"Configuring Serial Signal Polarities" on page 284

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
e1-options	E1 interfaces	E1 Interfaces Overview
e3-options	E3 interfaces	E3 Interfaces Overview
encapsulation type	All interfaces, except loopback and multicast tunnel	"Configuring Interface Encapsulation on Physical Interfaces" on page 116
encoding (nrz nrzi)	Serial interfaces (EIA-530, V.35, and X.21)	"Configuring Serial Line Encoding" on page 287
epd-threshold cells	ATM2 interfaces	Configuring ATM2 IQ VC Tunnel CoS Components
es-options	ES interfaces	Junos OS Services Interfaces Configuration Guide
ethernet-policer-profile	Gigabit Ethernet and Gigabit Ethernet IQ and IQE PICs with SFPs (except the 10-port Gigabit Ethernet PIC, and the built-in Gigabit Ethernet port on the M7i router)	Configuring Gigabit Ethernet Policers
ethernet-switch-profile	Gigabit Ethernet and Gigabit Ethernet IQ and IQE PICs with SFPs (except the 10-port Gigabit Ethernet PIC, Aggregated Ethernet with Gigabit Ethernet IQ interfaces, and the built-in Gigabit Ethernet port on the M7i router)	Configuring Gigabit Ethernet Policers, Configuring MAC Address Filtering, and Configuring the Management Ethernet Interface
facility-override facility-name	Adaptive services interfaces	Junos OS Services Interfaces Configuration Guide
fastether-options	Fast Ethernet interfaces	Ethernet Interfaces Overview
fcs (16 32)	E1/E3, SONET/SDH, and T1/T3 interfaces	Configuring the E1 Frame Checksum, Configuring the E3 Frame Checksum, Configuring SONET/SDH Physical Interface Properties, Configuring the T1 Frame Checksum, and Configuring the T3 Frame Checksum
feac-loop-respond no-feac-loop-respond)	T3 interfaces	Configuring the T3 FEAC Response
flow-control no-flow-control)	Aggregated Ethernet, Fast Ethernet, and Gigabit Ethernet interfaces	Configuring Flow Control
force	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
forwarding-class <i>class-name</i>	ATM2 IQ interfaces	Configuring ATM2 IQ VC Tunnel CoS Components
forwarding-class <i>class-name</i>	Gigabit Ethernet IQ interfaces	Configuring Gigabit Ethernet Policers
fragment-threshold <i>bytes</i>	Multilink, link services, and voice services interfaces	Junos OS Services Interfaces Configuration Guide
framing <i>framing-type</i>	E1, E3, and T1 interfaces	Configuring E3 and T3 Parameters on ATM Interfaces, Configuring E1 Framing, and Configuring T1 Framing
framing <i>framing-type</i>	10-Gigabit Ethernet interfaces	10-Gigabit Ethernet Framing Overview
framing <i>framing-type</i>	SONET interfaces	Configuring SONET/SDH Physical Interface Properties
gether-options	Gigabit Ethernet and Tri-Rate Ethernet copper interfaces	Ethernet Interfaces Overview
(gratuitous-arp-reply no-gratuitous-arp-reply)	Ethernet interfaces	Configuring Gratuitous ARP
hello-timer <i>milliseconds</i>	Link services and voice services interfaces	Junos OS Services Interfaces Configuration Guide
high-plp-max-threshold	ATM2 interfaces	Configuring ATM2 IQ VC Tunnel CoS Components
high-plp-threshold <i>percent</i>	ATM2 interfaces	Configuring ATM2 IQ VC Tunnel CoS Components
hold-time <i>milliseconds</i>	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties
hold-time up <i>milliseconds</i> down <i>milliseconds</i>	All interfaces, except aggregated SONET/SDH, generalized routing encapsulation (GRE) tunnel, and IP tunnel	"Damping Interface Transitions" on page 147 and Configuring SONET/SDH Physical Interface Properties
host <i>hostname</i>	Adaptive services interfaces	Junos OS Services Interfaces Configuration Guide
ieee802.1p premium [<i>values</i>]	Gigabit Ethernet IQ interfaces	Configuring Gigabit Ethernet Policers
idle-cycle-flag <i>value</i>	E1, E3, T1, and T3 interfaces	Configuring the E1 Idle Cycle Flag, Configuring the E3 Idle Cycle Flag, Configuring the T1 Idle Cycle Flag, and Configuring the T3 Idle Cycle Flag

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
ignore-all	Serial interfaces (EIA-530, V.35, and X.21)	"Configuring the Serial Signal Handling" on page 281
ilmi	ATM interfaces	Configuring Communication with Directly Attached ATM Switches and Routers
inactivity-timeout seconds	Adaptive services interfaces	Junos OS Services Interfaces Configuration Guide
indication (ignore normal require)	Serial interfaces (X.21)	"Configuring the Serial Signal Handling" on page 281
indication-polarity (negative positive)	Serial interfaces (X.21)	"Configuring Serial Signal Polarities" on page 284
ingress-rate-limit rate	8-port, 12-port, and 48-port Fast Ethernet interfaces	Configuring the Ingress Rate Limit
init-command-string <i>initialization-command-string;</i>	For USB ports (umd0) on J4350 and J6350 Services Routers	"Specifying a USB Modem Interface on J Series Routers" on page 102
input-priority-map	Gigabit Ethernet IQ interfaces	Configuring Gigabit Ethernet Policers
interface-type type	Channelized IQ and IQE interfaces, ISDN interfaces	Channelized Interfaces Overview and Configuring ISDN Physical Interface Properties
invert-data	DS0, E1, E3, and T1 interfaces	Configuring E1 Data Inversion, Configuring E3 Data Inversion, and Configuring T1 Data Inversion
isdn-options	ISDN interfaces	Configuring ISDN Logical Interface Properties
keepalives <down-count <i>number</i> <interval <i>seconds</i> > <up-count <i>number</i> >	Aggregated SONET/SDH, DS0, E1, E3, SONET/SDH, T1, and T3 interfaces	"Configuring Keepalives" on page 136
lACP mode	Aggregated Ethernet interfaces	Configuring Aggregated Ethernet LACP
line-encoding (ami b8zs)	T1 interfaces	Configuring T1 Line Encoding
line-protocol protocol	Serial interfaces (EIA-530, V.35, and X.21)	"Configuring the Serial Line Protocol" on page 275
line-rate line-rate	ATM interfaces on J Series routers	Configuring SHDSL Operating Mode on an ATM Physical Interface
linear-red-profile profile-name	ATM2 interfaces	Configuring ATM2 IQ VC Tunnel CoS Components

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
<code>linear-red-profiles profile-name</code>	ATM2 interfaces	Configuring ATM2 IQ VC Tunnel CoS Components
<code>link-layer-overhead percent</code>	AS PIC link services IQ interfaces (lsq)	Junos OS Services Interfaces Configuration Guide
<code>link-mode mode</code>	Management Ethernet (fxp0 or em0) and Fast Ethernet interfaces	"Configuring the Link Characteristics" on page 106
<code>link-speed speed</code>	Aggregated Ethernet interfaces	Configuring Aggregated Ethernet Link Speed
<code>link-speed speed</code>	Aggregated SONET/SDH interfaces	Configuring Aggregated SONET/SDH Interfaces
<code>lmi lmi-options</code>	Interfaces with Frame Relay encapsulation	Configuring Frame Relay Keepalives and Junos OS Services Interfaces Configuration Guide
<code>lmi</code>	OAM CFM Ethernet Local Management Interface	Configuring Ethernet Local Management Interface
<code>lmi-type (ansi itu)</code>	Link services interfaces and interfaces with Frame Relay encapsulation	Configuring Frame Relay Keepalives
<code>local-name name</code>	Interfaces with PPP encapsulation	"Configuring the PPP Challenge Handshake Authentication Protocol" on page 121
<code>lockout</code>	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties
<code>log-prefix prefix-number</code>	Adaptive services interfaces	Junos OS Services Interfaces Configuration Guide
<code>(long-buildout no-long-buildout)</code>	T3 interfaces	Configuring the T3 Line Buildout
<code>(loop-timing no-loop-timing)</code>	Channelized IQ interfaces	Configuring the Channelized T3 Loop Timing
<code>loopback mode</code>	DS0, E1, E3, T1, T3, SHDSL on ATM and ATM interfaces on J Series routers, and SONET/SDH interfaces	Configuring E1 Loopback Capability, Configuring E3 Loopback Capability, Configuring T1 Loopback Capability, Configuring T3 Loopback Capability, Configuring SHDSL Operating Mode on an ATM Physical Interface, and Configuring SONET/SDH Physical Interface Properties
<code>loopback mode</code>	Ethernet and 10-Gigabit Ethernet interfaces in WAN PHY mode	Configuring Ethernet Loopback Capability

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
loopback mode	Serial interfaces	"Configuring Serial Loopback Capability" on page 285
(loopback no-loopback)	Aggregated Ethernet, Fast Ethernet, and Gigabit Ethernet interfaces	Configuring Ethernet Loopback Capability
loss-priority (high low)	Gigabit Ethernet IQ interfaces	Configuring Gigabit Ethernet Policers
lowest-priority-defect (all-defects err-xcon mac-rem-err-xcon no-defect rem-err-xcon xcon)	Configuring IEEE 802.1ag OAM connectivity-fault management	Configuring a Maintenance Endpoint
low-plp-max-threshold percent	ATM2 interfaces	Configuring ATM2 IQ VC Tunnel CoS Components
low-plp-threshold percent	ATM2 interfaces	Configuring ATM2 IQ VC Tunnel CoS Components
lsq-failure-options	Link services IQ (lsq) interfaces	Junos OS Services Interfaces Configuration Guide
mac mac-address	Management Ethernet interface (fxp0 or em0)	Configuring the MAC Address on the Management Ethernet Interface
(mac-learn-enable no-mac-learn-enable)	Gigabit Ethernet IQ and IQE, Tri-Rate Ethernet copper, and Gigabit Ethernet PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router)	Configuring Gigabit Ethernet Policers
master-only;	Management Ethernet (fxp0 or em0) and Fast Ethernet interfaces	Configuring a Consistent Management IP Address
maximum-vcs maximum-vcs	ATM interfaces	Configuring the Maximum Number of ATM1 VCs on a VP
mc-ae	Aggregated Ethernet interfaces	Configuring Multichassis Link Aggregation
minimum-links number	Multilink, link services, and voice services interfaces	Junos OS Services Interfaces Configuration Guide
mip-half-function	Connectivity Fault Management	Configuring IEEE 802.3ah OAM Link-Fault Management
mlfr-uni-nni-bundle-options bundle-options	Link services and voice services interfaces	Junos OS Services Interfaces Configuration Guide
modem-options	For USB ports (umd0) on J4350 and J6350 Services Routers	"Specifying a USB Modem Interface on J Series Routers" on page 102

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
mpls	10-Gigabit Ethernet interfaces in WAN PHY mode and ATM and SONET/SDH interfaces in passive monitoring mode	Removing MPLS Labels from Incoming Packets, Enabling Passive Monitoring on SONET/SDH Interfaces, and Configuring SONET/SDH Physical Interface Properties
mrru bytes	Link services and voice services interfaces	<i>Junos Services Interfaces Configuration Guide</i>
mtu bytes	All interfaces, except management Ethernet (fxp0 or em0), loopback, multilink, and multicast tunnel	"Configuring the Media MTU" on page 106
multicast-statistics	Ethernet, SONET, aggregated Ethernet, and aggregated SONET interfaces.	Configuring Multicast Statistics Collection on Aggregated Ethernet Interfaces, Configuring Multicast Statistics Collection on SONET Interfaces, Configuring Multicast Statistics Collection on Ethernet Interfaces, and Configuring Multicast Statistics Collection on Aggregated SONET Interfaces
multiservice-options	Adaptive services, monitoring services, and collector interfaces	"Configuring Multiservice Physical Interface Properties" on page 147
n391 number	Link services and voice services interfaces	<i>Junos OS Services Interfaces Configuration Guide</i>
n392 number	Link services and voice services interfaces	<i>Junos OS Services Interfaces Configuration Guide</i>
n393 number	Link services and voice services interfaces	<i>Junos OS Services Interfaces Configuration Guide</i>
neighbor address	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties
no-gratuitous-arp-request	Ethernet interfaces	Configuring Gratuitous ARP
no-keepalives	Interfaces with PPP, Frame Relay, or Cisco High-level Data Link Control (HDLC) encapsulation	"Configuring Keepalives" on page 136
no-partition	Channelized IQ interfaces	Channelized Interfaces Overview
no-termination-request	Link Services IQ (LSQ) interfaces	<i>Junos OS Services Interfaces Configuration Guide</i>
oam-liveness	ATM interfaces	Configuring the OAM F4 Cell Flows

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
oam-period (<i>seconds</i> <i>disable</i>)	ATM interfaces	Defining the ATM OAM F5 Loopback Cell Period
oc-slice <i>oc-slice-range</i>	Channelized OC12 IQ interfaces	Channelized OC12/STM4 IQ and IQE Interfaces Overview
open-timeout <i>seconds</i>	Adaptive services interfaces	Junos OS Services Interfaces Configuration Guide
optics-options	Gigabit Ethernet dense wavelength-division multiplexing (DWDM) interfaces	10-Gigabit Ethernet DWDM Interface Wavelength Overview
output-priority-map	Gigabit Ethernet IQ interfaces	Configuring Gigabit Ethernet Policers
overflow (<i>discard</i> <i>tag</i>) (Receive bucket)	All interfaces, except ATM, channelized E1, E1, Fast Ethernet, Gigabit Ethernet, and channelized IQ interfaces	“Configuring Receive and Transmit Leaky Bucket Properties” on page 138 and Configuring Receive and Transmit Leaky Bucket Properties on SONET/SDH Interfaces
overflow (<i>discard</i>) (Transmit bucket)		
paired-group <i>group-name</i>	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties
partition <i>partition-number</i>	Channelized IQ interfaces	Channelized Interfaces Overview
passive	Interfaces with PPP encapsulation	“Configuring the PPP Challenge Handshake Authentication Protocol” on page 121
passive-monitor-mode	SONET/SDH interfaces	Enabling Passive Monitoring on SONET/SDH Interfaces
path-trace <i>trace-string</i>	10-Gigabit Ethernet interfaces in WAN PHY mode and SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties and Configuring SONET/SDH Physical Interface Properties
(payload-scrambler no-payload-scrambler)	E3, SONET/SDH, and T3 interfaces	Configuring E3 and T3 Parameters on ATM Interfaces, Configuring E3 HDLC Payload Scrambling, Configuring SONET/SDH Physical Interface Properties, and Configuring T3 HDLC Payload Scrambling
periodic <i>interval</i>	Aggregated Ethernet interfaces	Configuring Aggregated Ethernet LACP
per-unit-scheduler	IQ interfaces	Junos OS Services Interfaces Configuration Guide

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
pfcc	Interfaces with PPP encapsulation	"Configuring the PPP Protocol Field Compression" on page 130
pic-type (atm1 atm2)	ATM2 IQ interfaces	Configuring the ATM PIC Type
plp1 cells	ATM2 interfaces	Configuring ATM2 IQ VC Tunnel CoS Components
plp-to-clp	ATM2 IQ interfaces	Configuring ATM2 IQ VC Tunnel CoS Components
policer cos-policer-name	Gigabit Ethernet and Gigabit Ethernet IQ and IQE PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router)	Configuring Gigabit Ethernet Policers
pop-all-labels	ATM and SONET/SDH interfaces in passive monitoring mode	Removing MPLS Labels from Incoming Packets and Enabling Passive Monitoring on SONET/SDH Interfaces
ppp-options	Interfaces with PPP encapsulation	"Configuring the PPP Challenge Handshake Authentication Protocol" on page 121
premium	Enhanced Intelligent Queuing (IQE) interfaces (hierarchical policer)	"Applying Policers" on page 199 and Junos OS Class of Service Configuration Guide
premium	Gigabit Ethernet IQ interfaces (policer)	Configuring Gigabit Ethernet Policers
premium	Gigabit Ethernet IQ interfaces (output priority map)	Configuring Gigabit Ethernet Policers
primary sp-fpc/pic/port	Redundant interfaces for adaptive services interfaces (rsp-)	Junos OS Services Interfaces Configuration Guide
priority (high low)	ATM2 IQ interfaces	Configuring ATM2 IQ VC Tunnel CoS Components
priority number	Ethernet protocols (OAM CFM)	Configuring a Maintenance Endpoint
promiscuous-mode	ATM2 IQ interfaces	Configuring ATM Cell-Relay Promiscuous Mode
protect-circuit group-name	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties
queue-depth cells	ATM2 interfaces	Configuring ATM2 IQ VC Tunnel CoS Components

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
queue-length <i>number</i>	ATM1 interfaces	Configuring the ATM1 Queue Length
rate <i>percentage</i>	All interfaces, except ATM, channelized E1, E1, Fast Ethernet, Gigabit Ethernet, and channelized IQ	"Configuring Receive and Transmit Leaky Bucket Properties" on page 138 and Configuring Receive and Transmit Leaky Bucket Properties on SONET/SDH Interfaces
receive-bucket	All interfaces, except ATM, Fast Ethernet, and Gigabit Ethernet	"Configuring Receive and Transmit Leaky Bucket Properties" on page 138
red-differential-delay <i>milliseconds</i>	Link services and voice services interfaces	Junos OS Services Interfaces Configuration Guide
redundancy-options	Redundant interfaces for adaptive services interfaces (rsp-)	Junos OS Services Interfaces Configuration Guide
remote-loopback-respond	T1 interfaces	Configuring the T1 Remote Loopback Response
request	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties
required-depth <i>number</i>	ATM and SONET/SDH interfaces in passive monitoring mode	Removing MPLS Labels from Incoming Packets and Enabling Passive Monitoring on SONET/SDH Interfaces
revert-time <i>seconds</i>	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties
rfc-2615	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties
rts (assert de-assert normal)	Serial interfaces (EIA-530 and V.35)	"Configuring the Serial Signal Handling" on page 281
rts-polarity (negative positive)	Serial interfaces (EIA-530 and V.35)	"Configuring Serial Signal Polarities" on page 284
rtvbr <i>peak rate</i> <i>sustained rate</i> <i>burst length</i>	ATM interfaces	Defining the ATM Traffic-Shaping Profile
scheduler-maps <i>map-name</i>	ATM2 interfaces	Configuring ATM2 IQ VC Tunnel CoS Components
schedulers <i>number</i>	Ethernet IQ2 and IQ2-E PICs port interfaces	Junos OS Services Interfaces Configuration Guide
secondary <i>sp-fpc/pic/port</i>	Redundant interfaces for adaptive services interfaces (rsp-)	Junos OS Services Interfaces Configuration Guide

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
services-options	Services interfaces	<i>Junos OS Services Interfaces Configuration Guide</i>
serial-options	Serial interfaces (EIA-530, V.35, and X.21)	"Serial Interfaces Overview" on page 273
services priority-level	Adaptive services interfaces	<i>Junos OS Services Interfaces Configuration Guide</i>
shdsl-options	ATM interfaces on J Series routers	Configuring SHDSL Operating Mode on an ATM Physical Interface
size	All	"Tracing Operations of the Interface Process" on page 248
shaping	ATM interfaces	Defining the ATM Traffic-Shaping Profile
shaping	Circuit Emulation PICs	Configuring ATM QoS or Shaping
snext margin	ATM interfaces on J Series routers	Configuring SHDSL Operating Mode on an ATM Physical Interface
snr-margin	ATM interfaces on J Series routers	Configuring SHDSL Operating Mode on an ATM Physical Interface
sonet-options	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties
source-address-filter mac-address	Aggregated Ethernet, Fast Ethernet, Tri-Rate Ethernet copper, and Gigabit Ethernet interfaces	Enabling Ethernet MAC Address Filtering
(source-filtering no-source-filtering)	Aggregated Ethernet, Fast Ethernet, Tri-Rate Ethernet copper, Gigabit Ethernet, Gigabit Ethernet IQ and IQE, and Gigabit Ethernet interfaces with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router)	Enabling Ethernet MAC Address Filtering
speed (10m 100m 1g auto)	Management Ethernet interface (fxp0 or em0), Tri-Rate Ethernet copper interfaces, and 12-port and 48-port Fast Ethernet interfaces	Configuring the Interface Speed on Ethernet Interfaces
speed (oc3 oc12 oc48)	SONET/SDH PICs with SFP	"Configuring the Speed of SONET/SDH Interfaces" on page 134
spid1spid2	ISDN interfaces	Configuring ISDN Physical Interface Properties and Configuring ISDN Logical Interface Properties

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
stacked-vlan-tagging	Gigabit Ethernet IQ interfaces	Stacking and Rewriting Gigabit Ethernet VLAN Tags Overview
start-end-flag (filler shared)	DS0, E1, E3, T1, and T3 interfaces	Configuring E1 Start and End Flags, Configuring the E3 Start and End Flags, Configuring T1 Start and End Flags, and Configuring T3 Start and End Flags
switching-mode (bidirectional unidirectional)	Unchannelized OC3, OC12, and OC48 SONET/SDH interfaces on T Series routers	Configuring SONET/SDH Physical Interface Properties
syslog	Adaptive services interfaces	Junos OS Services Interfaces Configuration Guide
(syslog no-syslog)	Adaptive services, monitoring services, and collector interfaces	"Configuring Multiservice Physical Interface Properties" on page 147
t1-options	T1 interfaces	T1 Interfaces Overview
t3-options	T3 interfaces	T3 Interfaces Overview
t310	ISDN interfaces	Configuring ISDN Physical Interface Properties
t391 seconds	Link services and voice services interfaces	Junos OS Services Interfaces Configuration Guide
t392 number	Link services and voice services interfaces	Junos OS Services Interfaces Configuration Guide
tei-option (first-call power-up)	ISDN interfaces	Configuring ISDN Physical Interface Properties
threshold bytes	All interfaces, except ATM, channelized E1, E1, Fast Ethernet, Gigabit Ethernet, and channelized IQ	"Configuring Receive and Transmit Leaky Bucket Properties" on page 138 and Configuring Receive and Transmit Leaky Bucket Properties on SONET/SDH Interfaces
timeslots <i>time-slot-range</i>	Channelized T1 IQ and channelized E1 IQ interfaces	Channelized Interfaces Overview
tm (ignore normal require)	Serial interfaces (EIA-530)	"Configuring the Serial Signal Handling" on page 281
tm-polarity (negative positive)	Serial interfaces (EIA-530)	"Configuring Serial Signal Polarities" on page 284
traceoptions	All	"Tracing Operations of an Individual Router Interface" on page 146

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
traceoptions	All	"Tracing Operations of the Interface Process" on page 248
transmit-bucket	All interfaces, except ATM, Fast Ethernet, Tri-Rate Ethernet copper, and Gigabit Ethernet	"Configuring Receive and Transmit Leaky Bucket Properties" on page 138
transmit-clock invert	Serial interfaces (EIA-530, V.35, and X.21)	"Configuring the Serial Clocking Mode" on page 279
transmit-weight (cells <i>number</i> percent <i>number</i>)	ATM2 IQ interfaces	Configuring ATM2 IQ VC Tunnel CoS Components
(traps no-traps)	All	"Enabling or Disabling SNMP Notifications on Physical Interfaces" on page 148
trigger <i>defect ignore</i> <i>defect hold-time up milliseconds down milliseconds</i> ;	10-Gigabit Ethernet interfaces in WAN PHY mode and ATM over SONET/SDH and SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties
(unframed no-unframed)	E3 IQ interfaces	Configuring E3 IQ and IQE Unframed Mode
unidirectional	10-Gigabit Ethernet interfaces on: <ul style="list-style-type: none"> • MX960 4-Port 10-Gigabit Ethernet DPC • T Series 10-Gigabit Ethernet IQ2 PIC • T Series 10-Gigabit Ethernet IQ2E PIC 	"Enabling Unidirectional Traffic Flow on Physical Interfaces" on page 148
vbr <i>peak rate</i> <i>sustained rate</i> <i>burst length</i>	ATM interfaces	Defining the ATM Traffic-Shaping Profile
vc-cos-mode (alternate strict)	ATM2 interfaces	Configuring ATM2 IQ VC Tunnel CoS Components
vlan-tagging	Fast Ethernet, Tri-Rate Ethernet copper, and Gigabit Ethernet interfaces	802.1Q VLANs Overview
vlan-vci-tagging	Fast Ethernet, Tri-Rate Ethernet copper, Gigabit Ethernet, 10-Gigabit Ethernet, and aggregated Ethernet interfaces	"Configuring ATM-to-Ethernet Interworking" on page 236
vpi <i>vpi-identifier</i>	ATM interfaces	Configuring ATM Cell-Relay Promiscuous Mode and Configuring the Maximum Number of ATM1 VCs on a VP
vtmapping	Channelized STM1 interfaces	Configuring Channelized STM1 Interfaces
warning <i>warning-name</i> (<i>syslog</i> <i>link-down</i>)	10-Gigabit Ethernet interfaces	Configuring 10-Gigabit Ethernet Link Down Notification for Optics Options Alarm or Warning

Table 8: Statements for Physical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
wavelength <i>nm</i>	Gigabit Ethernet dense wavelength-division multiplexing (DWDM) interfaces	10-Gigabit Ethernet DWDM Interface Wavelength Overview
working-circuit <i>group-name</i>	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties
yellow-differential-delay <i>milliseconds</i>	Link services and voice services interfaces	Junos OS Services Interfaces Configuration Guide
(z0-increment no-z0-increment)	SONET/SDH interfaces	Configuring SONET/SDH Physical Interface Properties

Interface Ranges

The Junos OS allows you to group a range of identical interfaces into an *interface range*. You first specify the group of identical interfaces in the interface range. Then you can apply a common configuration to the specified interface range, reducing the number of configuration statements required and saving time while producing a compact configuration.

- Configuring Interface Ranges on page 92
- Expanding Interface Range Member and Member Range Statements on page 96
- Configuration Inheritance for Member Interfaces on page 97
- Member Interfaces Inheriting Configuration from Configuration Groups on page 98
- Interfaces Inheriting Common Configuration on page 99
- Configuring Inheritance Range Priorities on page 100
- Configuration Expansion Where Interface Range Is Used on page 100

Configuring Interface Ranges

To configure an interface range, include the **interface-range** statement at the **[edit interfaces]** hierarchy level.

The **interface-range** statement accepts only physical networking interface names in its definition. The following interface types are supported and example CLI descriptors are shown:

- ATM—**at-fpc/pic/port**
- Channelized—**(coc | cstm)n-fpc/pic/port**
- DPC—**xe-fpc/pic/port**
- E1/E3—**(e1 | e3)-fpc/pic/port**
- Ethernet—**(xe | ge | fe)-fpc/pic/port**

- ISDN—*isdn-fpc/pic/port*
- Serial—*se-fpc/pic/port*
- SONET/SDH—*so-fpc/pic/port*
- T1/T3—*(t1 | t3)-fpc/pic/port*

Interfaces can be grouped either as a range of interfaces or using a number range under the **interface-range** statement definition.

Interfaces in an **interface-range** definition can be added as part of a member range or as individual members or multiple members using a number range.

To specify a member range, use the **member-range** statement at the **[edit interfaces interface-range name]** hierarchy level.

To specify interfaces in lexical order, use the **member-range start-range to end-range** statement.

A range for a member statement should contain the following:

- *****—All, specifies all available interfaces.
- **num**—Number, specifies one specific interface by its number.
- **[low-high]**—Numbers between low to high, specifies a range of sequential interfaces.
- **[num1, num2, num3]**—Numbers **num1**, **num2**, and **num3** specify multiple specific interfaces.

**Example: Specifying an
Interface Range
Member Range**

```
member-range ge-0/0/0 to ge-4/0/40;
```

To specify one or multiple members, use the **member** statement at the **[edit interfaces interface-range name]** hierarchy level.

To specify the list of interface range members individually or for multiple interfaces using regex, use the **member list of interface names** statement.

**Example: Specifying an
Interface Range
Member**

```
member ge-0/0/0;  
member ge-0/*/*;  
member ge-0/[1-10]/0;  
member ge-0/[1,2,3]/3;
```

Regex or wildcards are not supported for interface-type prefixes. For example, prefixes **ge**, **fe**, and **xe** must be mentioned explicitly.

An **interface-range** definition can contain both **member** and **member-range** statements within it. There is no maximum limit on the number of **member** or **member-range** statements within an interface-range. However, at least one **member** or **member-range** statement must exist within an **interface-range** definition.

Example: Interface Range Common Configuration

Configuration common to an interface range can be added as a part of the **interface-range** definition, as follows:

```
[edit]
interfaces {
  + interface-range foo {
  + member-range ge-1/0/0 to ge-4/0/40;
  + member ge-0/1/1;
  + member ge-5/[1-10]/*;
    /*Common configuration is added as part of interface-range definition*/
    mtu 256;
    hold-time up 10;
    ether-options {
      flow-control;
      speed {
        100m;
      }
      802.3ad primary;
    }
  }
}
```

An **interface-range** definition having just **member** or **member-range** statements and no common configurations statements is valid.

These defined interface ranges can be used in other configuration hierarchies, in places where an **interface** node exists.

**Example:
Interface-Range foo
Used Under the
Protocols Hierarchy**

```
protocols {
  dot1x {
    authenticator {
      interface foo{
        retries 1;
      }
    }
  }
}
```

foo should be an **interface-range** defined at the **[interfaces]** hierarchy level. In the above example, the **interface** node can accept both individual interfaces and interface ranges.



TIP: To view an interface range in expanded configuration, use the **(show | display inheritance)** command. For more information, see the [Junos OS CLI User Guide](#).

By default, **interface-range** is not available to configure in the CLI where the **interface** statement is available. The following locations are supported; however, some of the hierarchies shown in this list are product specific:

- protocols dot1x authentication interface
- protocols dvmrp interface
- protocols oam ethernet lmi interface

- protocols esis interface
- protocols igmp interface
- protocols igmp-host client *num* interface
- protocols mld-host client *num* interface
- protocols router-advertisement interface
- protocols isis interface
- protocols ldp interface
- protocols oam ethernet link-fault-management interface
- protocols lldp interface
- protocols link-management peer lmp-control-channel interface
- protocols link-management peer control-channel
- protocols link-management te-link *name* interface
- protocols mld interface
- protocols ospf area *id* interface
- protocols pim interface
- protocols router-discovery interface
- protocols rip group *name* neighbour
- protocols ripng group *name* neighbour
- protocols rsvp interface
- protocols snmp interface
- protocols layer2-control bpdu-block interface
- protocols layer2-control mac-rewrite interface
- protocols mpls interface
- protocols stp interface
- protocols rstp interface
- protocols mstp interface
- protocols vstp interface
- protocols mstp msti *id* interface
- protocols mstp msti vlan *id* interface
- protocols vstp vlan *name* interface
- protocols gvrp interface
- protocols igmp-snooping vlan *name* interface
- protocols lldp interface

- protocols lldp-med interface
- protocols sflow interfaces
- ethernet-switching-options analyzer *name* input [egress | ingress] interface
- ethernet-switching-options analyzer *name* output interface
- ethernet-switching-options secure-access-port interface
- ethernet-switching-options interfaces ethernet-switching-options voip interface
- ethernet-switching-options redundant-trunk-group group *g1* interface
- ethernet-switching-options redundant-trunk-group group *g1* interface
- ethernet-switching-options bpd-block interface
- poe interface vlans pro-bng-mc1-bsd1 interface

Expanding Interface Range Member and Member Range Statements

All **member** and **member-range** statements in an interface range definition are expanded to generate the final list of interface names for the specified interface range.

Example: Expanding Interface Range Member and Member Range Statements

```
[edit]
interfaces {
  interface-range range-1 {
    member-range ge-0/0/0 to ge-4/0/20;
    member ge-10/1/1;
    member ge-5/[0-5]/*;
    /*Common configuration is added part of the interface-range definition*/
    mtu 256;
    hold-time up 10;
    ether-options {
      flow-control;
      speed {
        100m;
      }
      802.3ad primary;
    }
  }
}
```

For the **member-range** statement, all possible interfaces between **start-range** and **end-range** are considered in expanding the members. For example, the following **member-range** statement:

member-range ge-0/0/0 to ge-4/0/20

expands to:

```
[ge-0/0/0, ge-0/0/1 ... ge-0/0/max_ports
ge-0/1/0 ge-0/1/1 ... ge-0/1/max_ports
ge-0/2/0 ge-0/2/1 ... ge-0/2/max_ports
.
.
ge-0/MAX_PICS/0 ... ge-0/max_pics/max_ports
ge-1/0/0 ge-1/0/1 ... ge-1/0/max_ports
```

```

      .
ge-1/MAX_PICS/0 ... ge-1/max_pics/max_ports
      .
      .
ge-4/0/0 ge-4/0/1 ... ge-4/0/max_ports]

```

The following **member** statement:

ge-5/[0-5]/*

expands to:

```

ge-5/0/0 ... ge-5/0/max_ports
ge-5/1/0 ... ge-5/0/max_ports
      .
      .
ge-5/5/0 ... ge-5/5/max_ports

```

The following **member** statement:

ge-5/1/[2,3,6,10]

expands to:

```

ge-5/1/2
ge-5/1/3
ge-5/1/6
ge-5/1/10

```

Configuration Inheritance for Member Interfaces

When the Junos OS expands the **member** and **member-range** statements present in an **interface-range**, it creates *interface objects* if they are not explicitly defined in the configuration. The common configuration is copied to all its member interfaces in the **interface-range**.

Example: Foreground interface configuration takes priority compared to configuration inherited by the interface through the **interface-range**.

Configuration Priorities

```

interfaces {
  interface-range range-1 {
    member-range ge-1/0/0/ to ge-10/0/47;
    mtu 256;
  }
  ge-1/0/1 {
    mtu 1024;
  }
}

```

In the preceding example, interface **ge-1/0/1** will have an MTU value of 1024.

This can be verified with output of the **show interfaces | display inheritance** command, as follows:

```

user@host: # show interfaces | display inheritance
## 'ge-1/0/0' was expanded from interface-range 'range-1'
##
ge-1/0/0 {
  ##

```

```
    ## '256' was expanded from interface-range 'range-1'
    ##
    mtu 256;
}
ge-1/0/1 {
    mtu 1024;
}
##
## 'ge-1/0/2' was expanded from interface-range 'range-1'
##
ge-1/0/2 {
    ##
    ## '256' was expanded from interface-range 'range-1'
    ##
    mtu 256;
}
    .....
    .....
##
## 'ge-10/0/47' was expanded from interface-range 'range-1'
##
ge-10/0/47 {
    ##
    ## '256' was expanded from interface-range 'range-1'
    ##
    mtu 256;
}
```

Member Interfaces Inheriting Configuration from Configuration Groups

Interface range member interfaces inherit the config-groups configuration like any other foreground configuration. **interface-range** is similar to any other foreground configuration statement. The only difference is that the **interface-range** goes through a member interfaces expansion before the Junos OS reads this configuration.

```
groups {
  global {
    interfaces {
      <*> {
        hold-time up 10;
      }
    }
  }
  apply-groups [global];
  interfaces {
    interface-range range-1 {
      member-range ge-1/0/0 to ge-10/0/47;
      mtu 256;
    }
  }
}
```

The **hold-time** configuration is applied to all members of **interface-range** *range-1*.

This can be verified with **show interfaces | display inheritance** as below:

```
user@host# show interfaces | display inheritance
ge-1/0/0 {
  ##
```



```

    ## '256' was expanded from interface-range 'range-1'
    ##
    mtu 256;
    ##
    ## 'hold-time' was inherited from group 'global'
    ## '10' was inherited from group 'global'
    ##
    hold-time up 10;
}
ge-1/0/1 {
    ##
    ## '256' was expanded from interface-range 'range-1'
    ##
    mtu 256;
    ##
    ## 'hold-time' was inherited from group 'global'
    ## '10' was inherited from group 'global'
    ##
    hold-time up 10;
}
ge-10/0/47 {
    ##
    ## '256' was expanded from interface-range 'range-1'
    ##
    mtu 256;
    ##
    ## 'hold-time' was inherited from group 'global'
    ## '10' was inherited from group 'global'
    ##
    hold-time up 10;
}

```

Interfaces Inheriting Common Configuration

If an interface is a member of several interface ranges, that interface will inherit the common configuration from all of those interface ranges.

```

[edit]
interfaces {
  interface-range range-1 {
    member-range ge-1/0/0 to ge-10/0/47;
    mtu 256;
  }
}
interfaces {
  interface-range range-1 {
    member-range ge-10/0/0 to ge-10/0/47;
    hold-time up 10;
  }
}

```

In this example, interfaces **ge-10/0/0** through **ge-10/0/47** will have both **hold-time** and **mtu**.

Configuring Inheritance Range Priorities

The interface ranges are defined in the order of inheritance priority, with the first interface range configuration data taking priority over subsequent interface ranges.

```
[edit]
interfaces {
  interface-range int-grp-one {
    member-range ge-0/0/0 to ge-4/0/40;
    member ge-1/1/1;
    /*Common config is added part of the interface-range definition*/
    mtu 256;
    hold-time up 10;
  }
}
interfaces {
  interface-range int-grp-two {
    member-range ge-5/0/0 to ge-10/0/40;
    member ge-1/1/1;
    mtu 1024;
  }
}
```

Interface **ge-1/1/1** exists in both **interface-range *int-grp-one*** and **interface-range *int-grp-two***. This interface inherits **mtu 256** from **interface-range *int-grp-one*** because it was defined first.

Configuration Expansion Where Interface Range Is Used

In this example, **interface-range *range-1*** is used under the **protocols** hierarchy:

```
[edit]
interfaces {
  interface-range range-1 {
    member ge-10/1/1;
    member ge-5/5/1;
    mtu 256;
    hold-time up 10;
    ether-options {
      flow-control;
      speed {
        100m;
      }
      802.3ad primary;
    }
  }
}
protocols {
  dot1x {
    authenticator {
      interface range-1 {
        retries 1;
      }
    }
  }
}
}
```

The **interface** node present under **authenticator** is expanded into member interfaces of the **interface-range range-1** as follows:

```
protocols {
  dot1x {
    authenticator {
      interface ge-10/1/1 {
        retries 1;
      }
      interface ge-5/5/1 {
        retries 1;
      }
    }
  }
}
```

The **interface range-1** statement is expanded into two interfaces, **ge-10/1/1** and **ge-5/5/1**, and configuration **retries 1** is copied under those two interfaces.

This configuration can be verified using the **show protocols dot1x | display inheritance** command.

Specifying an Aggregated Interface

The M Series, MX Series, and T Series routers support aggregated interfaces.

You specify aggregated interfaces by assigning a number for the aggregated interface. For aggregated Ethernet interfaces, configure **ae** as in the following example:

```
[edit interfaces]
ae0 {
  ...
}
```

For aggregated SONET/SDH interfaces, configure **as** as in the following example:

```
[edit interfaces]
as0 {
  ...
}
```

The maximum number of aggregated Ethernet interfaces is 128, and the assigned number can be from 0 through 127. The maximum number of aggregated Ethernet interfaces (LAG bundles) on all MX Series routers is 480, and the assigned number can be from 0 through 479. The maximum number of aggregated SONET interfaces is 16, and the assigned number can be from 0 through 15. You should not mix SONET and SDH modes on the same aggregated interface.



NOTE: SONET/SDH aggregation is proprietary to the Junos OS and might not work with other software.

If you are configuring VLANs for aggregated Ethernet interfaces, you must include the **vlan-tagging** statement at the **[edit interfaces aex]** hierarchy level to complete the association.

For more information, see Aggregated Ethernet Interfaces Overview and Configuring Aggregated SONET/SDH Interfaces.

Specifying a USB Modem Interface on J Series Routers

The J Series routers contain two USB ports controlled by a single USB controller. One USB port can support USB devices, while the other one can act as a USB modem.

The USB modem provides a dial-in remote management interface, and supports dialer interface features by sharing the same dial pool as a dialer interface. The dial pool allows the logical dialer interface (**dln**) and the physical interface (**umd0**) to be bound together dynamically on a per-call basis.

The following dialer interface features are supported by the USB modem interface:

- Encapsulation PPP
- CoS
- NAT
- Interface statistics
- Packet capture
- GRE tunnel
- Stateful firewall
- Traffic sampling

To configure a USB modem interface, include the following statements at the **[edit interfaces]** hierarchy level:

```
[edit interfaces]
umd0 {
  dialer-options {
    pool pool-name <priority priority>;
  }
  modem-options {
    dialin (console | routable);
    init-command-string initialization-command-string;
  }
}
```

The pool name specified at the **[edit interfaces umd0 dialer-options pool]** hierarchy level must be the same as the pool name specified at the **[edit interfaces dln unit logical-unit-number dialer-options pool]** hierarchy level.

Configure the USB modem to operate as a dial-in WAN backup interface by including the **dialin** statement and specifying the **routable** option. If the USB modem is to be used as a dial-in console, specify the **console** option in the **dialin** statement.

When the Services Router applies the modem AT commands configured in the **init-command-string** statement or the default sequence of initialization commands to the modem, it compares them to the initialization commands already configured on the modem and makes the following changes:

- If the commands are the same, the router overrides the existing modem values that do not match. For example, if the initialization commands on the modem include S0=0 and the router's **init-command-string** configuration includes S0=2, the Services Router applies S0=2.
- If the initialization commands on the modem do not include a command in the router's **init-command-string** statement configuration, the router adds it. For example, if the **init-command-string** statement includes the command L2, but the modem commands do not include it, the router adds L2 to the initialization commands configured on the modem.

Include the following statements at the **[edit interfaces dln]** hierarchy level to support a minimum configuration for a dialer interface connected to a USB modem:

```
[edit interfaces dln]
encapsulation ppp;
unit logical-unit-number;
dialer-options {
    dial-string dial-string-numbers;
    pool pool-name <priority priority>;
}
ppp-options {
    chap;
    access-profile name;
    local-name name;
    passive;
}
family inet {
    mtu bytes;
    address address {
        destination address;
    }
}
```

For more information about configuring dial-in, see *Configuring ISDN Logical Interface Properties*.

Specifying OC768-over-OC192 Mode

The T Series routers support OC768-over-OC192 mode on the 4-port OC192c PIC. In OC768-over-OC192 mode, four OC192 links are aggregated into one OC768 link with one logical interface. This single interface achieves data rates of approximately 40 Gbps. OC768 optics are expensive, and most long-distance networks currently use fiber optics and regenerators that cannot carry OC768 SONET. When you create an OC768 pipe as a large data pipe running over existing infrastructures, you transfer network traffic without link bonding or load sharing over parallel links. Load sharing is automatically accomplished in the Junos OS using a proprietary method, and does not need to be manually configured.

The following limitations apply to OC768-over-OC192 mode:

- The maximum difference in delay between all links in the bundle is 8 μ (microseconds), equivalent to approximately 1.5 km maximum difference in length between the longest and shortest fiber pairs.
- If a single link in the bundle fails, the whole bundle fails. If link redundancy is required, implement an aggregated SONET/SDH bundle instead.
- Only routers that contain 4-port OC192 PICs can operate in OC768-over-OC192 mode.

To configure the 4-port OC192 PIC to operate in OC768-over-OC192 mode on a TX Matrix router, include the **aggregate-ports** statement at the **[edit chassis lcc lcc-number fpc slot-number pic pic-number]** hierarchy level:

```
[edit chassis]
lcc lcc-number {
  fpc slot-number {
    pic pic-number {
      aggregate-ports;
    }
  }
}
...
```

To configure the 4-port OC192 PIC to operate in OC768-over-OC192 mode on a T640 router, include the **aggregate-ports** statement at the **[edit chassis fpc slot-number pic pic-number]** hierarchy level:

```
[edit chassis]
fpc slot-number {
  pic pic-number {
    aggregate-ports;
  }
}
...
```

When you configure the 4-port OC192 PIC for OC768-over-OC192 mode, only port 0 (the first port) needs be configured as the OC768 port.

To display logical and physical interface information, use the operational mode command **show interfaces so-fpc/pic/port extensive**. When this command is used for the 4-port OC192 PIC configured for OC768-over-OC192 mode, only port 0 (**so-fpc/pic/0**) is displayed. This port is displayed as **OC768**.

Adding an Interface Description to the Configuration

You can include a text description of each physical interface in the configuration file. Any descriptive text you include is displayed in the output of the **show interfaces** commands, and is also exposed in the **ifAlias** Management Information Base (MIB) object. It has no impact on the interface's configuration. To add a text description, include the **description** statement at the **[edit interfaces interface-name]** hierarchy level:

```
[edit interfaces interface-name]
description text;
```

The description can be a single line of text. If the text contains spaces, enclose it in quotation marks.



NOTE: You can configure the extended DHCP relay to include the interface description in the option 82 Agent Circuit ID suboption. See [Enabling and Disabling Insertion of Option 82 Information in the *Junos OS Subscriber Access Configuration Guide*](#).

For information about describing logical units, see “Adding a Logical Unit Description to the Configuration” on page 164.

Example: Adding an Interface Description to the Configuration

Add a description to a Fast Ethernet interface:

```
[edit interfaces]
user@host#

set fe-0/0/1 description "Backbone connection to PHL01"
[edit interfaces]
user@host#

show
fe-0/0/1 {
  description "Backbone connection to PHL01";
  unit 0 {
    family inet {
      address 192.168.0.1/30;
    }
  }
}
```

To display the description from the router or switch CLI, use the **show interfaces** command:

```
user@host>

show interfaces fe-0/0/1
Physical interface: fe-0/0/1, Enabled, Physical link is Up
  Interface index: 129, SNMP ifIndex: 23
  Description: Backbone connection to PHL01
  ...
```

To display the interface description from the interfaces MIB, use the **snmpwalk** command from a server. To isolate information for a specific interface, search for the interface index shown in the **SNMP ifIndex** field of the **show interfaces** command output. The **ifAlias** object is in **ifXTable**.

```
user-server>snmpwalk host-fxp0.mylab public ifXTable | grep -e '\.23'
snmpwalk host-fxp0.mylab public ifXTable | grep -e '\.23'
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifName.23 = fe-0/0/1
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifInMulticastPkts.23 = Counter32: 0
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifInBroadcastPkts.23 = Counter32: 0
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifOutMulticastPkts.23 = Counter32: 0
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifOutBroadcastPkts.23 = Counter32: 0
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifHCInOctets.23 = Counter64: 0
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifHCInUcastPkts.23 = Counter64: 0
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifHCInMulticastPkts.23 = Counter64: 0
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifHCInBroadcastPkts.23 = Counter64: 0
```

```
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifHCOctets.23 = Counter64: 42
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifHCUcastPkts.23 = Counter64: 0
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifHCMulticastPkts.23 = Counter64: 0
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifHCBroadcastPkts.23 = Counter64: 0
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifLinkUpDownTrapEnable.23 = enabled(1)
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifHighSpeed.23 = Gauge32: 100
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifPromiscuousMode.23 = false(2)
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifConnectorPresent.23 = true(1)
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifAlias.23 = Backbone connection to PHL01
ifMIB.ifMIBObjects.ifXTable.ifXEntry.ifCounterDiscontinuityTime.23 = Timeticks:
(0) 0:00:00.00
```

Configuring the Link Characteristics

By default, the router's management Ethernet interface, **fxp0** or **em0**, autonegotiates whether to operate in full-duplex or half-duplex mode. Fast Ethernet and J Series router Gigabit Ethernet interfaces can operate in either full-duplex or half-duplex mode, and all other interfaces can operate only in full-duplex mode. For Gigabit Ethernet, the link partner must also be set to full duplex.



NOTE: When you configure the Tri-Rate Ethernet copper interface to operate at 1 Gbps, autonegotiation must be enabled.



NOTE: When you manually configure Fast Ethernet interfaces on the M Series and T Series routers, link mode and speed must both be configured. If both these values are not configured, the router uses autonegotiation for the link and ignores the user-configured settings.



NOTE: When the Fast Ethernet interface on Juniper Networks routers with autonegotiation enabled interoperates with a device configured to operate in half-duplex mode (autonegotiation disabled), the interface defaults to half-duplex mode after the PIC is taken offline and brought back online. This results in packet loss and cyclic redundancy check (CRC) errors.

To explicitly configure an Ethernet interface to operate in either full-duplex or half-duplex mode, include the **link-mode** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
  link-mode (full-duplex | half-duplex);
```

Configuring the Media MTU

The default media MTU size used on a physical interface depends on the encapsulation used on that interface. In some cases, the default IP Protocol MTU depends on whether the protocol used is IP version 4 (IPv4) or International Organization for Standardization (ISO). Table 9 on page 107 through Table 19 on page 113 list the media and protocol MTU

sizes by interface type, and Table 20 on page 114 lists the encapsulation overhead by encapsulation type.

Table 9: Media MTU Sizes by Interface Type for M5, M7i with CFEB, M10, M10i with CFEB, M20, and M40 Routers

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
Adaptive Services (MTU size not configurable)	9192	N/A	N/A
ATM	4482	9192	4470
E1/T1	1504	9192	1500
E3/T3	4474	9192	4470
Fast Ethernet	1514	9192 (4-port) 1532 (8-port) 1532 (12-port)	1500 (IPv4), 1497 (ISO)
Gigabit Ethernet	1514	9192	1500 (IPv4), 1497 (ISO)
Serial	1504	9192	1500 (IPv4), 1497 (ISO)
SONET/SDH	4474	9192	4470

Table 10: Media MTU Sizes by Interface Type for M40e Routers

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
Adaptive Services (MTU size not configurable)	9192	N/A	N/A
ATM	4482	9192	4470
E1/T1	1504	4500	1500
E3/T3	4474	4500 9192 (4-port)	4470
E3/DS3 IQ	4474	9192	4470
Fast Ethernet	1514	4500	1500 (IPv4), 1497 (ISO)

Table 10: Media MTU Sizes by Interface Type for M40e Routers (*continued*)

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
Gigabit Ethernet	1514	9192 (1- or 2-port) 9192 (4-port)	1500 (IPv4), 1497 (ISO)
Serial	1504	9192	1500 (IPv4), 1497 (ISO)
SONET/SDH	4474	4500 (1-port nonconcatenated) 9192 (4-port OC3) 9192 (4-port OC3c) 4500 (1-port OC12) 4500 (4-port OC12) 4500 (4-port OC12c) 4500 (1-port OC48) 9192 (2-port OC3) 9192 (2-port OC3c) 9192 (1-port OC12c) 9192 (1-port OC48c) 4500 (1-port OC192) 9192 (1-port OC192c)	4470

Table 11: Media MTU Sizes by Interface Type for M160 Routers

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
Adaptive Services (MTU size not configurable)	9192	N/A	N/A
ATM	4482	9192	4470
E1/T1	1504	4500	1500
E3/T3	4474	4500	4470
E3/DS3 IQ	4474	9192	4470
Fast Ethernet	1514	4500	1500 (IPv4), 1497 (ISO)

Table 11: Media MTU Sizes by Interface Type for M160 Routers (*continued*)

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
Gigabit Ethernet	1514	9192 (1- or 2-port) 4500 (4-port)	1500 (IPv4), 1497 (ISO)
Serial	1504	9192	1500 (IPv4), 1497 (ISO)
SONET/SDH	4474	4500 (1-port nonconcatenated) 9192 (1- or 2-port) 4500 (4-port)	4470

Table 12: Media MTU Sizes by Interface Type for M7i with CFEB-E, M10i with CFEB-E, M320 and M120 Routers

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
ATM2 IQ	4482	9192	4470
Channelized DS3 IQ	4471	4500	4470
Channelized E1 IQ	1504	4500	1500
Channelized OC12 IQ	4474	9192	4470
Channelized STM1 IQ	4474	9192	4470
DS3	4471	4500	4470
E1	1504	4500	1500
E3 IQ	4471	4500	4470
Fast Ethernet	1514	9192 (4-port) 1532 (8-, 12- and 48-port)	1500 (IPv4), 1497 (ISO)
Gigabit Ethernet	1514	9192	1500 (IPv4), 1497 (ISO)
SONET/SDH	4474	9192	4470
T1	1504	4500	1500

Table 12: Media MTU Sizes by Interface Type for M7i with CFEB-E, M10i with CFEB-E, M320 and M120 Routers (*continued*)

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
CT3 IQ (excluding M120)	4474	9192	4470

Table 13: Media MTU Sizes by Interface Type for MX Series Routers

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
Gigabit Ethernet	1514	9192	1500 (IPv4) 1488 (MPLS) 1497 (ISO)

Table 14: Media MTU Sizes by Interface Type for T320 Routers

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
ATM	4482	9192	4470
ATM2 IQ	4482	9192	4470
Channelized OC12 IQ	4474	9192	4470
Channelized STM1 IQ	4474	9192	4470
DS3	4471	4500	4470
Fast Ethernet	1514	4500 (4-port) 1532 (12- and 48-port)	1500 (IPv4), 1497 (ISO)
Gigabit Ethernet	1514	9192	1500 (IPv4), 1497 (ISO)
SONET/SDH	4474	9192	4470
CT3 IQ	4474	9192	4470

Table 15: Media MTU Sizes by Interface Type for T640 Platforms

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
ATM2 IQ	4482	9192	4470

Table 15: Media MTU Sizes by Interface Type for T640 Platforms (*continued*)

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
48-port Fast Ethernet	1514	1532	1500 (IPv4), 1497 (ISO)
Gigabit Ethernet	1514	9192	1500 (IPv4), 1497 (ISO)
SONET/SDH	4474	9192	4470
CT3 IQ	4474	9192	4470

Table 16: Media MTU Sizes by Interface Type for J2300 Platforms

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
Fast Ethernet (10/100)	1514	9192	1500
G.SHDSL	4482	9150	4470
ISDN BRI	1504	4092	1500
Serial	1504	9150	1500
T1 or E1	1504	9150	1500

Table 17: Media MTU Sizes by Interface Type for J4300 and J6300 Platforms

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
ADSL2+ PIM	4482	9150	4470
Dual-port Fast Ethernet (10/100) PIM	1514	9192	1500
Dual-port Serial PIM	1504	9150	1500
Dual-port T1 or E1 PIM	1504	9150	1500
Dual-port Channelized T1/E1 PIM (channelized to DS0s)	1504	4500	1500

Table 17: Media MTU Sizes by Interface Type for J4300 and J6300 Platforms (*continued*)

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
Dual-port Channelized T1/E1 PIM (clear channel T1 or E1)	1504	9150	1500
Fast Ethernet (10/100) built-in interface	1514	9192	1500
G.SHDSL PIM	4482	9150	4470
4-port ISDN BRI PIM	1504	4092	1500
T3 (DS3) or E3 PIM	4474	9192	4470

Table 18: Media MTU Sizes by Interface Type for J4350 and J6350 Platforms

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
4-port ISDN BRI PIM	1504	4092	1500
ADSL2+ PIM	4482	9150	4470
Dual-port Fast Ethernet (10/100) PIM	1514	9192	1500
Dual-port Serial PIM	1504	9150	1500
Dual-port T1 or E1 PIM	1504	9150	1500
Dual-port Channelized T1/E1 PIM (channelized to DS0s)	1504	4500	1500
Dual-port Channelized T1/E1 PIM (clear channel T1 or E1)	1504	9150	1500
4-port Fast Ethernet (10/100) ePIM	1518	1518	1500
Gigabit Ethernet (10/100/1000) built-in interface	1514	9018	1500

Table 18: Media MTU Sizes by Interface Type for J4350 and J6350 Platforms (*continued*)

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
Gigabit Ethernet (10/100/1000) Enhanced Physical Interface Module (ePIM)	1514	9018	1500
Gigabit Ethernet (10/100/1000) SFP ePIM	1514	9018	1500
G.SHDSL PIM	4482	9150	4470
T3 (DS3) or E3 PIM	4474	9192	4470



NOTE: On Gigabit Ethernet ePIMs in J4350 and J6350 Services Routers, you can configure a maximum transmission unit (MTU) size of only 9018 bytes even though the CLI indicates that you can configure an MTU of up to 9192 bytes. If you configure an MTU greater than 9018 bytes, the router does not accept the configuration and generates a system log error message similar to the following:

```
/kernel: ge-0/0/0: Illegal media change. MTU invalid: 9192. Max MTU supported on this PIC: 9018
```

On 4-port Fast Ethernet ePIMs in J4350 and J6350 Services Routers, you can configure a maximum transmission unit (MTU) size of only 1518 bytes even though the CLI indicates that you can configure an MTU of up to 9192 bytes. If you configure an MTU greater than 1518 bytes, the router does not accept the configuration and generates a system log error message similar to the following:

```
/kernel: fe-3/0/1: Illegal media change. MTU invalid: 9192. Max MTU supported on this PIC: 1518
```

Table 19: Media MTU Sizes by Interface Type for EX Series Switches

Interface Type	Default Media MTU (Bytes)	Maximum MTU (Bytes)	Default IP Protocol MTU (Bytes)
Gigabit Ethernet	1514	9192	1500 (IPv4), 1497 (ISO)
10-Gigabit Ethernet	1514	9192	1500 (IPv4), 1497 (ISO)

Table 20: Encapsulation Overhead by Encapsulation Type

Interface Encapsulation	Encapsulation Overhead (Bytes)
802.1Q/Ethernet 802.3	21
802.1Q/Ethernet Subnetwork Access Protocol (SNAP)	26
802.1Q/Ethernet version 2	18
ATM Cell Relay	4
ATM permanent virtual connection (PVC)	12
Cisco HDLC	4
Ethernet 802.3	17
Ethernet circuit cross-connect (CCC) and virtual private LAN service (VPLS)	4
Ethernet over ATM	32
Ethernet SNAP	22
Ethernet translational cross-connect (TCC)	18
Ethernet version 2	14
Extended virtual local area network (VLAN) CCC and VPLS	4
Extended VLAN TCC	22
Frame Relay	4
PPP	4
VLAN CCC	4
VLAN VPLS	4
VLAN TCC	22

The default media MTU is calculated as follows:

Default media MTU = Default IP MTU + encapsulation overhead

When you are configuring point-to-point connections, the MTU sizes on both sides of the connections must be the same. Also, when you are configuring point-to-multipoint connections, all interfaces in the subnet must use the same MTU size.



NOTE: The actual frames transmitted also contain cyclic redundancy check (CRC) bits, which are not part of the media MTU. For example, the media MTU for a Gigabit Ethernet Version 2 interface is specified as 1514 bytes, but the largest possible frame size is actually 1518 bytes; you need to consider the extra bits in calculations of MTUs for interoperability.

The physical MTU for Ethernet interfaces does not include the 4-byte frame check sequence (FCS) field of the Ethernet frame.

A SONET/SDH interface operating in concatenated mode has a “c” added to the rate descriptor. For example, a concatenated OC48 interface is referred to as OC48c.

If you do not configure an MPLS MTU, the Junos OS derives the MPLS MTU from the physical interface MTU. From this value, the software subtracts the encapsulation-specific overhead and space for the maximum number of labels that might be pushed in the Packet Forwarding Engine. Currently, the software provides for three labels of four bytes each, for a total of 12 bytes.

In other words, the formula used to determine the MPLS MTU is the following:

$$\text{MPLS MTU} = \text{physical interface MTU} - \text{encapsulation overhead} - 12$$

If you configure an MTU value by including the `mtu` statement at the `[edit interfaces interface-name unit logical-unit-number family mpls]` hierarchy level, the configured value is used.

For information about configuring the encapsulation on an interface, see “Configuring Interface Encapsulation on Physical Interfaces” on page 116.

To modify the default media MTU size for a physical interface, include the `mtu` statement at the `[edit interfaces interface-name]` hierarchy level:

```
[edit interfaces interface-name]
mtu bytes;
```

If you change the size of the media MTU, you must ensure that the size is equal to or greater than the sum of the protocol MTU and the encapsulation overhead.



NOTE: Changing the media MTU or protocol MTU causes an interface to be deleted and added again.

You configure the protocol MTU by including the `mtu` statement at the following hierarchy levels:

- `[edit interfaces interface-name unit logical-unit-number family family]`
- `[edit logical-systems logical-system-name interfaces interface-name unit logical-unit-number family family]`

Because tunnel services interfaces are considered logical interfaces, you cannot configure the MTU setting for the physical interface. This means you cannot include the **mtu** statement at the **[edit interfaces *interface-name*]** hierarchy level for the following interface types: generic routing encapsulation (**gr-**), IP-IP (**ip-**), loopback (**lo-**), link services (**ls-**), multilink services (**ml-**), and multicast (**pe-**, **pd-**). You can, however, configure the protocol MTU on tunnel interfaces, as described in “Setting the Protocol MTU” on page 195.

Configuring Interface Encapsulation on Physical Interfaces

Point-to-Point Protocol (PPP) encapsulation is the default encapsulation type for physical interfaces. You need not configure encapsulation for any physical interfaces that support PPP encapsulation. If you do not configure encapsulation, PPP is used by default. For physical interfaces that do not support PPP encapsulation, you must configure an encapsulation to use for packets transmitted on the interface.

You can optionally configure an encapsulation on a logical interface, which is the encapsulation used within certain packet types. For more information about logical interface encapsulation, see “Configuring the Encapsulation on a Logical Interface” on page 168.

This section contains the following topics:

- Configuring the Encapsulation on a Physical Interface on page 116
- Encapsulation Capabilities on page 120

Configuring the Encapsulation on a Physical Interface

By default, PPP is the encapsulation type for physical interfaces. To configure the encapsulation on a physical interface, include the **encapsulation** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]  
encapsulation (atm-ccc-cell-relay | atm-pvc | cisco-hdlc | cisco-hdlc-ccc | cisco-hdlc-tcc  
| ethernet-ccc | ethernet-over-atm | ethernet-tcc | ethernet-vpls |  
extended-frame-relay-ccc | extended-frame-relay-ether-type-tcc |  
extended-frame-relay-tcc | extended-vlan-ccc | extended-vlan-tcc | extended-vlan-vpls  
| flexible-ethernet-services | flexible-frame-relay | frame-relay | frame-relay-ccc |  
frame-relay-ether-type | frame-relay-ether-type-tcc | frame-relay-port-ccc |  
frame-relay-tcc | multilink-frame-relay-uni-nni | ppp | ppp-ccc | ppp-tcc | vlan-ccc |  
vlan-vpls);
```

The physical interface encapsulation can be one of the following:

- ATM CCC cell relay—Connects two remote virtual circuits or ATM physical interfaces with a label-switched path (LSP). Traffic on the circuit is ATM cells.

You can configure an ATM1 Physical Interface Card (PIC) to use cell-relay accumulation mode (CAM). In this mode, the incoming cells (1 to 8 cells) are packaged into a single packet and forwarded to the LSP. Cell-relay accumulation mode is not supported on ATM2 PICs. You configure CAM as shown in the following example:

```
[edit chassis]  
fpc 1 {  
  pic 0 {
```

```

        atm-cell-relay-accumulation;
    }
}

```

For more information, see the *Junos OS System Basics Configuration Guide*.

- **ATM PVC**—Defined in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*. When you configure physical ATM interfaces with ATM PVC encapsulation, an RFC 2684-compliant ATM Adaptation Layer 5 (AAL5) tunnel is set up to route the ATM cells over a Multiprotocol Label Switching (MPLS) path that is typically established between two MPLS-capable routers using the Label Distribution Protocol (LDP).
- **Cisco HDLC**—E1, E3, SONET/SDH, T1, and T3 interfaces can use Cisco HDLC encapsulation. Two related versions are supported:
 - **CCC version (`cisco-hdlc-ccc`)**—The logical interface does not require an encapsulation statement. When you use this encapsulation type, you can configure the **ccc** family only.
 - **TCC version (`cisco-hdlc-tcc`)**—Similar to CCC and has the same configuration restrictions, but used for circuits with different media on either side of the connection.
- **Ethernet over ATM**—As defined in RFC 1483, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*, this encapsulation type allows ATM interfaces to connect to devices that support only bridged-mode protocol data units (BPDUs). The Junos OS does not completely support bridging, but accepts BPDU packets as a default gateway. If you use the router as an edge device, then the router acts as a default gateway. It accepts Ethernet logical link control (LLC)/SNAP frames with IP or Address Resolution Protocol (ARP) in the payload, and drops the rest. For packets destined to the Ethernet local area network (LAN), a route lookup is done using the destination IP address. If the route lookup yields a full address match, the packet is encapsulated with an LLC/SNAP and media access control (MAC) header, and the packet is forwarded to the ATM interface.
- **Ethernet cross-connect**—Ethernet interfaces without VLAN tagging can use Ethernet CCC encapsulation. Two related versions are supported:
 - **CCC version (`ethernet-ccc`)**—Ethernet interfaces with standard Tag Protocol ID (TPID) tagging can use Ethernet CCC encapsulation. When you use this encapsulation type, you can configure the **ccc** family only.
 - **TCC version (`ethernet-tcc`)**—Similar to CCC, but used for circuits with different media on either side of the connection.

For 8-port, 12-port, and 48-port Fast Ethernet PICs, TCC is not supported.

- **VLAN CCC (`vlan-ccc`)**—Ethernet interfaces with VLAN tagging enabled can use VLAN CCC encapsulation. VLAN CCC encapsulation supports TPID 0x8100 only. When you use this encapsulation type, you can configure the **ccc** family only.
- **Extended VLAN cross-connect**—Gigabit Ethernet interfaces with VLAN 802.1Q tagging enabled can use extended VLAN cross-connect encapsulation. (Ethernet interfaces with standard TPID tagging can use VLAN CCC encapsulation.) Two related versions of extended VLAN cross-connect are supported:

- CCC version (**extended-vlan-ccc**)—Extended VLAN CCC encapsulation supports TPIDs 0x8100, 0x9100, and 0x9901. When you use this encapsulation type, you can configure the **ccc** family only.
- TCC version (**extended-vlan-tcc**)—Similar to CCC, but used for circuits with different media on either side of the connection.

For 8-port, 12-port, and 48-port Fast Ethernet PICs, extended VLAN CCC is not supported. For 4-port Gigabit Ethernet PICs, extended VLAN CCC and extended VLAN TCC are not supported.

- Ethernet VPLS (**ethernet-vpls**)—Ethernet interfaces with VPLS enabled can use Ethernet VPLS encapsulation. For more information about VPLS, see the [Junos OS VPNs Configuration Guide](#) and the [Junos OS Feature Guides](#).
- Ethernet VLAN VPLS (**vlan-vpls**)—Ethernet interfaces with VLAN tagging and VPLS enabled can use Ethernet VLAN VPLS encapsulation. For more information about VPLS, see the [Junos OS VPNs Configuration Guide](#) and the [Junos OS Feature Guides](#).
- Extended VLAN VPLS (**extended-vlan-vpls**)—Ethernet interfaces with VLAN 802.1Q tagging and VPLS enabled can use Ethernet Extended VLAN VPLS encapsulation. (Ethernet interfaces with standard TPID tagging can use Ethernet VLAN VPLS encapsulation.) Extended Ethernet VLAN VPLS encapsulation supports TPIDs 0x8100, 0x9100, and 0x9901. For more information about VPLS, see the [Junos OS VPNs Configuration Guide](#) and the [Junos OS Feature Guides](#).
- Flexible Ethernet services (**flexible-ethernet-services**)—Gigabit Ethernet and Gigabit Ethernet IQ and IQE PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router) can use flexible Ethernet services encapsulation. Aggregated Ethernet bundles can use this encapsulation type. You use this encapsulation type when you want to configure multiple per-unit Ethernet encapsulations. This encapsulation type allows you to configure any combination of route, TCC, CCC, Layer 2 virtual private networks (VPNs), and VPLS encapsulations on a single physical port. If you configure flexible Ethernet services encapsulation on the physical interface, VLAN IDs from 1 through 511 are no longer reserved for normal VLANs.
- Flexible Frame Relay (**flexible-frame-relay**)—IQ and IQE interfaces can use flexible Frame Relay encapsulation. You use flexible Frame Relay encapsulation when you want to configure multiple per-unit Frame Relay encapsulations. This encapsulation type allows you to configure any combination of TCC, CCC, and standard Frame Relay encapsulations on a single physical port. Also, each logical interface can have any data-link connection identifier (DLCI) value from 1 through 1022.
- Frame Relay (**frame-relay**)—Defined in RFC 1490, *Multiprotocol Interconnect over Frame Relay*. E1, E3, link services, SONET/SDH, T1, T3, and voice services interfaces can use Frame Relay encapsulation. Five related versions are supported:

- CCC version (**frame-relay-ccc**)—The same as standard Frame Relay for DLCIs 0 through 511. DLCIs 512 through 1022 are dedicated to CCC. The logical interface must also have **frame-relay-ccc** encapsulation. When you use this encapsulation type, you can configure the **ccc** family only.
- TCC version (**frame-relay-tcc**)—Similar to Frame Relay CCC and has the same configuration restrictions, but used for circuits with different media on either side of the connection.
- Extended CCC version (**extended-frame-relay-ccc**)—This encapsulation type allows you to dedicate DLCIs 1 through 1022 to CCC. The logical interface must have **frame-relay-ccc** encapsulation. When you use this encapsulation type, you can configure the **ccc** family only.
- Extended TCC version (**extended-frame-relay-tcc**)—Similar to extended Frame Relay CCC, this encapsulation type allows you to dedicate DLCIs 1 through 1022 to TCC, which is used for circuits with different media on either side of the connection.
- Port CCC version (**frame-relay-port-ccc**)—Defined in the IETF document *Frame Relay Encapsulation over Pseudo-Wires* (expired December 2002). This encapsulation type allows you to transparently carry all the DLCIs between two customer edge (CE) routers without explicitly configuring each DLCI on the two provider edge (PE) routers with Frame Relay transport. The connection between the two CE routers can be either user-to-network interface (UNI) or network-to-network interface (NNI); this is completely transparent to the PE routers. The logical interface does not require an encapsulation statement. When you use this encapsulation type, you can configure the **ccc** family only.
- Frame Relay Ether Type (**frame-relay-ether-type**)—Physical interfaces can use Frame Relay ether type encapsulation for compatibility with Cisco Frame Relay. IETF frame relay encapsulation identifies the payload format using NLPID and SNAP formats. Cisco-compatible Frame Relay encapsulation uses the Ethernet type to identify the type of payload. Two related versions are supported:
 - TCC version (**frame-relay-ether-type-tcc**)—Cisco-compatible Frame Relay for DLCIs 0 through 511. DLCIs 512 through 1022 are dedicated to TCC. This encapsulation is used for circuits with different media on either side of the connection.
 - Extended TCC version (**extended-frame-relay-ether-type-tcc**)—This encapsulation allows you to dedicate Cisco-compatible Frame Relay TCC for DLCIs 1 through 1022. This encapsulation is used for circuits with different media on either side of the connection.
- Multilink Frame Relay (MLFR) UNI and NNI (**multilink-frame-relay-uni-nni**)—Link services and voice services interfaces functioning as FRF.16 bundles can use multilink Frame Relay UNI NNI encapsulation. This encapsulation is also used on link services and voice services interfaces' constituent T1, E1, or NxDS0 interfaces.
- PPP—Defined in RFC 1661, *The Point-to-Point Protocol (PPP) for the Transmission of Multiprotocol Datagrams over Point-to-Point Links*. PPP is the default encapsulation type for physical interfaces. E1, E3, SONET/SDH, T1, and T3 interfaces can use PPP encapsulation. Two related versions are supported:

- Circuit cross-connect (CCC) version (**ppp-ccc**)—The logical interface does not require an encapsulation statement. When you use this encapsulation type, you can configure the **ccc** family only.
- Translational cross-connect (TCC) version (**ppp-tcc**)—Similar to CCC and has the same configuration restrictions, but used for circuits with different media on either side of the connection.



NOTE: When the encapsulation type is set to Cisco-compatible Frame Relay encapsulation, ensure that the LMI type is set to ANSI or Q933-A.

Encapsulation Capabilities

When you configure a point-to-point encapsulation (such as PPP or Cisco HDLC) on a physical interface, the physical interface can have only one logical interface (that is, only one **unit** statement) associated with it. When you configure a multipoint encapsulation (such as Frame Relay), the physical interface can have multiple logical units, and the units can be either point-to-point or multipoint.

Ethernet CCC encapsulation for Ethernet interfaces with standard TPID tagging requires that the physical interface have only a single logical interface. Ethernet interfaces in VLAN mode can have multiple logical interfaces.

For Ethernet interfaces in VLAN mode, VLAN IDs are applicable as follows:

- VLAN ID 0 is reserved for tagging the priority of frames.
- For encapsulation type **vlan-ccc**, VLAN IDs 1 through 511 are reserved for normal VLANs. VLAN IDs 512 and above are reserved for VLAN CCCs.
- For encapsulation type **vlan-vpls**, VLAN IDs 1 through 511 are reserved for normal VLANs, and VLAN IDs 512 through 4094 are reserved for VPLS VLANs. For 4-port Fast Ethernet interfaces, you can use VLAN IDs 512 through 1024 for VPLS VLANs.
- For Gigabit Ethernet interfaces and Gigabit Ethernet IQ and IQE PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), you can configure flexible Ethernet services encapsulation on the physical interface. For interfaces with **flexible-ethernet-services** encapsulation, all VLAN IDs are valid. VLAN IDs from 1 through 511 are not reserved.
- For encapsulation types **extended-vlan-ccc** and **extended-vlan-vpls**, all VLAN IDs are valid.

The upper limits for configurable VLAN IDs vary by interface type. For more information, see 802.1Q VLANs Overview.

When you configure a TCC encapsulation, some modifications are needed to handle VPN connections over unlike Layer 2 and Layer 2.5 links and terminate the Layer 2 and Layer 2.5 protocol locally.

The router performs the following media-specific changes:

- **PPP TCC**—Both Link Control Protocol (LCP) and Network Control Protocol (NCP) are terminated on the router. Internet Protocol Control Protocol (IPCP) IP address negotiation is not supported. The Junos OS strips all PPP encapsulation data from incoming frames before forwarding them. For output, the next hop is changed to PPP encapsulation.
- **Cisco HDLC TCC**—Keepalive processing is terminated on the router. The Junos OS strips all Cisco HDLC encapsulation data from incoming frames before forwarding them. For output, the next hop is changed to Cisco HDLC encapsulation.
- **Frame Relay TCC**—All Local Management Interface (LMI) processing is terminated on the router. The Junos OS strips all Frame Relay encapsulation data from incoming frames before forwarding them. For output, the next hop is changed to Frame Relay encapsulation.
- **ATM**—Operation, Administration, and Maintenance (OAM) and Interim Local Management Interface (ILMI) processing is terminated at the router. Cell relay is not supported. The Junos OS strips all ATM encapsulation data from incoming frames before forwarding them. For output, the next hop is changed to ATM encapsulation.

Example: Configuring the Encapsulation on a Physical Interface

Configure PPP encapsulation on a SONET/SDH interface. The second and third **family** statements allow Intermediate System-to-Intermediate System (IS-IS) and MPLS to run on the interface.

```
[edit interfaces]
so-7/0/0 {
  encapsulation ppp;
  unit 0 {
    point-to-point;
    family inet {
      address 192.168.1.113/32 {
        destination 192.168.1.114;
      }
    }
    family iso;
    family mpls;
  }
}
```

Configuring the PPP Challenge Handshake Authentication Protocol

For interfaces with PPP encapsulation, you can configure interfaces to support the PPP Challenge Handshake Authentication Protocol (CHAP), as defined in RFC 1994, *PPP Challenge Handshake Authentication Protocol (CHAP)*. When you enable CHAP on an interface, the interface can authenticate its peer and can be authenticated by its peer.

By default, PPP CHAP is disabled. If CHAP is not explicitly enabled, the interface makes no CHAP challenges and denies all incoming CHAP challenges. To enable CHAP, you must create an access profile, and you must configure the interfaces to use CHAP.

To configure a CHAP access profile, include the **profile** statement and specify a profile name at the **[edit access]** hierarchy level:

```
[edit access]
profile profile-name {
  client name chap-secret data;
}
```

For more information about configuring access profiles, see the [Junos OS System Basics Configuration Guide](#).

When you configure an interface to use CHAP, you must assign an access profile to the interface. When an interface receives CHAP challenges and responses, the access profile in the packet is used to look up the shared secret, as defined in RFC 1994.

If no matching access profile is found for the CHAP challenge that was received by the interface, the optionally configured default CHAP secret is used. The default CHAP secret is useful if the CHAP name of the peer is unknown, or if the CHAP name changes during PPP link negotiation.

To configure PPP CHAP on an interface with PPP encapsulation, include the **chap** statement at the **[edit interfaces *interface-name* ppp-options]** hierarchy level:

```
[edit interfaces interface-name ppp-options]
chap {
  access-profile name;
  default-chap-secret name;
  local-name name;
  passive;
}
```

On each interface with PPP encapsulation, you can configure the following PPP CHAP properties:

- Assigning an Access Profile to an Interface on page 122
- Configuring a Default CHAP Secret on page 123
- Configuring the Local Name on page 123
- Configuring Passive Mode on page 123
- Example: Configuring the PPP Challenge Handshake Authentication Protocol on page 123

When you configure PPP over ATM or Multilink PPP over ATM encapsulation, you can enable CHAP on the logical interface. For more information, see [Configuring PPP over ATM2 Encapsulation](#).

Assigning an Access Profile to an Interface

To assign an access profile to an interface, include the **access-profile** statement at the **[edit interfaces *interface-name* ppp-options chap]** hierarchy level:

```
[edit interfaces interface-name ppp-options chap]
access-profile name;
```

You must include the **access-profile** statement when you configure the CHAP authentication method. If an interface receives a CHAP challenge or response from a

peer that is not in the applied access profile, the link is immediately dropped unless a default CHAP secret has been configured. For information about configuring the default CHAP secret, see “Configuring a Default CHAP Secret” on page 123.

Configuring a Default CHAP Secret

To configure a default CHAP secret for an interface, include the **default-chap-secret** statement at the **[edit interfaces *interface-name* ppp-options chap]** hierarchy level:

```
[edit interfaces interface-name ppp-options chap]
default-chap-secret name;
```

The default CHAP secret is used when no matching CHAP access profile exists, or if the CHAP name changes during PPP link negotiation.

Configuring the Local Name

By default, when CHAP is enabled on an interface, the interface uses the router's system hostname as the name sent in CHAP challenge and response packets.

To configure the name the interface uses in CHAP challenge and response packets, include the **local-name** statement at the **[edit interfaces *interface-name* ppp-options chap]** hierarchy level:

```
[edit interfaces interface-name ppp-options chap]
local-name name;
```

The local name is any string from 1 to 250 characters in length, starting with an alphanumeric or underscore character, and including only the following characters:

```
a-z A-Z 0-9 % @ # / \ . _ -
```

Configuring Passive Mode

By default, when CHAP is enabled on an interface, the interface always challenges its peer and responds to challenges from its peer.

You can configure the interface not to challenge its peer, and only respond when challenged. To configure the interface not to challenge its peer, include the **passive** statement at the **[edit interfaces *interface-name* ppp-options chap]** hierarchy level:

```
[edit interfaces interface-name ppp-options chap]
passive;
```

Example: Configuring the PPP Challenge Handshake Authentication Protocol

Configure CHAP:

```
[edit access]
profile pe-A-ppp-clients;
client cpe-1 chap-secret "$1$dQYsZ$B5ojUeUjDsUo.yKwcCZ0";
    # SECRET-DATA
client cpe-2 chap-secret "$1$kdAsfaDAfkdjDsASxfafdkdFKJ";
    # SECRET-DATA
[edit interfaces so-1/2/0]
encapsulation ppp;
ppp-options {
```

```
chap {
  access-profile pe-A-ppp-clients;
  default-chap-secret "$9$mPafafhdsaiufhyrv1Rxd";
  local-name "pe-A-so-1/1/1";
}
}
[edit interfaces so-1/1/2]
encapsulation ppp;
ppp-options {
  chap {
    access-profile pe-A-ppp-clients;
    default-chap-secret "$9$mPafafhdsaiufhyrv1Rxd";
    local-name "pe-A-so-1/1/2";
  }
}
```

Configuring the PPP Password Authentication Protocol

For interfaces with PPP encapsulation, you can configure interfaces to support the Password Authentication Protocol (PAP), as defined in RFC 1334, *PAP Authentication Protocols*. If authentication is configured, the PPP link negotiates using CHAP or PAP protocol for authentication during the Link Control Protocol (LCP) negotiation phase. PAP is only performed after the link establishment phase (LCP up) portion of the authentication phase.

During authentication, the PPP link sends a PAP authentication-request packet to the peer with an ID and password. The authentication-request packet is sent every 2 seconds, similar to the CHAP challenge, until a response is received (acknowledgment packet, nonacknowledgment packet). If an acknowledgment packet is received, the PPP link transitions to the next state, the network phase. If a nonacknowledgment packet is received, an LCP terminate request is sent, and the PPP link goes back to the link establishment phase. If no response is received, and an optional retry counter is set to **true**, a new request acknowledgment packet is resent. If the retry counter expires, the PPP link transitions to the LCP negotiate phrase.

You can configure the PPP link with PAP in passive mode. By default, when PAP is enabled on an interface, the interface expects authenticate-request packets from the peer. However, the interface can be configured to send authentication request packets to the peer by configuring PAP to operate in passive mode. In PAP passive mode, the interface sends the authenticate-request packets to the peer only if the interface receives the PAP option from the peer during LCP negotiation—in passive mode, the interface does not authenticate the peer.

Both CHAP and PAP authentication can be configured on a PPP interface. If both are configured, CHAP is negotiated first. If CHAP authentication fails, PAP authentication is negotiated.

To enable PAP, you must create an access profile, and you must configure the interfaces to use PAP.

To configure a PAP access profile, include the **profile** statement and specify a profile name at the **[edit access]** hierarchy level:

```
[edit access]
profile profile-name {
  client name;
  pap-password password;
}
```

For more information about configuring access profiles, see the [Junos OS System Basics Configuration Guide](#).

When you configure an interface to use PAP, you must assign an access profile to the interface. When an interface receives PAP authentication requests, the access profile in the packet is used to look up the password.

If no matching access profile is found for the PAP authentication request that was received by the interface, the optionally configured default PAP password is used. For information about configuring the default PAP password, see “Configuring PPP PAP Authentication” on page 172.

To configure PPP PAP on a physical interface with PPP encapsulation, include the **pap** statement at the **[edit interfaces *interface-name* ppp-options]** hierarchy level:

```
[edit interfaces interface-name ppp-options]
pap {
  access-profile name;
  local-name name;
  local-password password;
  passive;
}
```

To configure PPP PAP on a logical interface with PPP encapsulation, include the **pap** statement with options:

```
pap {
  default-pap-password password;
  local-name name;
  local-password password;
  passive;
}
```

You can include these statements at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]**

For more information about configuring PAP for logical interfaces, see “Configuring PPP PAP Authentication” on page 172. For information about configuring tracing operations for PPP, see “Tracing Operations of the pppd Process” on page 128.

On each physical interface with PPP encapsulation, you can perform one of the following tasks:

- Configuring the Local Name on page 126
- Configuring the Local Password on page 126

- Configuring Passive Mode on page 126
- Example: Configuring PAP Authentication Protocol on page 126

Configuring the Local Name

By default, when PAP is enabled on an interface, the interface uses the router's system hostname as the name sent in PAP request and response packets.

To configure the name the interface uses in PAP request and response packets, include the **local-name** statement at the **[edit interfaces *interface-name* ppp-options pap]** hierarchy level:

```
[edit interfaces interface-name ppp-options pap]
local-name name;
```

Configuring the Local Password

You need to configure the password to be used for authentication. To configure the host password for sending PAP requests, include the **local-password** statement at the **[edit interfaces *interface-name* ppp-options pap]** hierarchy level:

```
[edit interfaces interface-name ppp-options pap]
local-password password;
```

Configuring Passive Mode

By default, when PAP is enabled on an interface, the interface expects authenticate-request packets from the peer. However, the interface can be configured to send authentication request packets to the peer by configuring PAP to operate in passive mode. In PAP passive mode, the interface sends the authenticate-request packets to the peer only if the interface receives the PAP option from the peer during LCP negotiation—in passive mode, the interface does not authenticate the peer.

To configure the interface to authenticate with PAP in passive mode, include the **passive** statement at the **[edit interfaces *interface-name* ppp-options pap]** hierarchy level:

```
[edit interfaces interface-name ppp-options pap]
passive;
```

Example: Configuring PAP Authentication Protocol

Configure a PAP access profile, the physical and logical interfaces, and tracing operations for PPP.

For PAP authentication, a username and password for the peer is configured in the access profile, along with a PAP password. Each user can have either a PAP password or a CHAP secret.

```
[edit access]
profile userlist1;
client {
  papuser {
    pap-password "#%@^***"; # SECRET-DATA;
  }
  chapuser {
```

```

        chap-secret "%@^***"; # SECRET-DATA;
    }
}

```

To configure the same name for the PAP password and the CHAP secret, configure the client with two different access profiles:

```

[edit access]
profile chap-profile;
client {
    sjcrouter {
        chap-secret "%@^***"; # SECRET-DATA;
    }
    boston {
        chap-secret "%@^***"; # SECRET-DATA;
    }
}
profile pap-profile;
client {
    sjcrouter {
        pap-password "%@^***"; # SECRET-DATA;
    }
    boston {
        pap-password "%@^***"; # SECRET-DATA;
    }
}
}

```

Configure the physical interface, including the access profile name to be used for PPP authentication:

```

[edit interfaces so-0/0/0]
ppp-options {
    pap {
        access-profile "pap-profile";
        local-name "rtrnum1";
        local-password "XXXXXXX"; #SECRET-DATA
        passive;
    }
}
}

```

Configure the logical interface, including the default PAP password to be used, should the access profile not be located during authentication:

```

[edit interfaces so-0/0/0]
encapsulation frame-relay;
unit 0 {
    dlci 100;
    encapsulation frame-relay-ppp;
    ppp-options {
        pap {
            local-name "rtrnum1";
            local-password "XXXXXXX"; #SECRET-DATA
            default-pap-password "XXXXX"; #SECRET-DATA
            passive;
        }
    }
}
}
}

```

Include the **pap** statement to trace PPP protocol operations:

```
[edit protocols]
ppp {
  traceoptions {
    flag {
      pap;
    }
  }
}
```

Monitoring a PPP Session

You can monitor PPP packet exchanges. When monitoring is enabled, packets exchanged during a session are logged by default to `/var/log/pppd`, or to the file specified in the **traceoptions** statement.

To configure PPP packet monitoring, include the **monitor-session** statement at the **[edit protocols ppp]** hierarchy level:

```
[edit protocols ppp]
monitor-session (interface-name | all);
```

When monitoring is configured, the operational mode commands **show ppp summary** and **show ppp interface** display a **Monitored** flag in the **Session flags** column or line.

Tracing Operations of the pppd Process

To trace the operations of the router's pppd process, include the **traceoptions** statement at the **[edit protocols ppp]** hierarchy level:

```
[edit protocols ppp]
traceoptions {
  file filename <files number> <match regular-expression> <size size> <world-readable |
    no-world-readable>;
  flag flag;
  level severity-level;
  no-remote-trace;
}
```

To specify more than one tracing operation, include multiple **flag** statements.

You can specify the following flags in the **traceoptions** statement:

- **access**—Trace access code
- **address-pool**—Trace address pool code
- **all**—Trace all areas of code
- **auth**—Trace authentication code
- **chap**—Trace challenge handshake authentication protocol code
- **ci**—Trace CI code
- **config**—Trace configuration code

- **ifdb**—Trace interface database code
- **lcp**—Trace LCP state machine code
- **memory**—Trace memory management code
- **message**—Trace message processing code
- **mlppp**—Trace multilink point-to-point protocol code
- **ncp**—Trace NCP state machine code
- **pap**—Trace password authentication protocol code
- **ppp**—Trace PPP protocol processing code
- **radius**—Trace RADIUS processing code
- **redundancy**—Trace redundancy code
- **rtsock**—Trace routing socket code
- **session**—Trace session management code
- **signal**—Trace signal handling code
- **timer**—Trace timer code
- **ui**—Trace user interface code

For general information about tracing, see the tracing and logging information in the [Junos OS System Basics Configuration Guide](#).

Configuring PPP Address and Control Field Compression

For interfaces with PPP, PPP CCC, or PPP TCC encapsulation, you can configure compression of the Data Link Layer address and control fields, as defined in RFC 1661, *The Point-to-Point Protocol (PPP)*. By default, the address and control fields are not compressed. This means PPP-encapsulated packets are transmitted with two 1-byte fields (0xff and 0x03). If you configure address and control field compression (ACFC) and ACFC is successfully negotiated with the local router's peer, the local router transmits packets without these 2 bytes. ACFC allows you to conserve bandwidth by transmitting less data.

On M320, M120, and T Series routers, ACFC is not supported for any ISO family protocols. Do not include the **acfc** statement at the **[edit interfaces *interface-name* ppp-options compression]** hierarchy level when you include the **family iso** statement at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level.



NOTE: The address and control fields cannot be compressed in Link Control Protocol (LCP) packets.

The PPP session restarts when you configure or modify compression options.

To configure ACFC, include the **compression** statement at the **[edit interfaces interface-name ppp-options]** hierarchy level, and specify **acfc**:

```
[edit interfaces interface-name ppp-options]
compression acfc;
```

This configuration causes the local router to try to negotiate ACFC with its peer. If ACFC is successfully negotiated, the local router sends packets with compressed address and control fields. When you include the **compression acfc** statement in the configuration, the PPP session restarts, and the local router sends the ACFC option in the LCP Configure-Request packet. The ACFC option informs the local router's peer that the local router can receive packets with compression. If the peer indicates that it, too, can receive packets with compression, then ACFC is negotiated. If ACFC is successfully negotiated, the local router can receive packets with or without the address and control bytes included.

To monitor the configuration, issue the **show interfaces interface-name** command. Configured options are displayed in the **link flags** field for the physical interface. Successfully negotiated options are displayed in the **flags** field for the logical interface. In this example, both ACFC and PFC are configured, but neither compression feature has been successfully negotiated.

```
user@router# run show interfaces so-0/1/1
Physical interface: so-0/1/1, Enabled, Physical link is Up
  Interface index: 133, SNMP ifIndex: 27
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC3,
  Loopback: None, FCS: 16
  Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : No-Keepalives ACFC PFC
  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 : 2004-12-29 10:49:32 PST (00:18:35 ago)
  Input rate    : 0 bps (0 pps)
  Output rate   : 0 bps (0 pps)
  SONET alarms  : None
  SONET defects : None
  Logical interface so-0/1/1.0 (Index 68) (SNMP ifIndex 169)
    Flags: Point-To-Point SNMP-Traps ACFC Encapsulation: PPP
    Protocol inet, MTU: 4470
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
    Destination: 3.3.3/24, Local: 3.3.3.2, Broadcast: 3.3.3.255
```

Configuring the PPP Protocol Field Compression

For interfaces with PPP, PPP CCC, or PPP TCC encapsulation, you can configure protocol field compression. By default, the protocol field is not compressed. This means PPP-encapsulated packets are transmitted with a two-byte protocol field. For example, IPv4 packets are transmitted with the protocol field set to 0x0021, and MPLS packets are transmitted with the protocol field set to 0x0281.

For all protocols with identifiers in the range 0x0000 through 0x00ff, you can configure the router to compress the protocol field to one byte, as defined in RFC 1661, *The Point-to-Point Protocol (PPP)*. Protocol field compression (PFC) allows you to conserve bandwidth by transmitting less data.



NOTE: The protocol field cannot be compressed in Link Control Protocol (LCP) packets.

The PPP session restarts when you configure or modify compression options.

To configure PFC, include the **compression** statement at the **[edit interfaces *interface-name* ppp-options]** hierarchy level, and specify **pfc**:

```
[edit interfaces interface-name ppp-options]
compression pfc;
```

This configuration causes the local router to try to negotiate PFC with its peer. If PFC is successfully negotiated, the local router sends packets with compressed protocol fields. When you include the **compression pfc** statement in the configuration, the PPP session restarts, and the local router sends the PFC option in the LCP Configure-Request packet. The PFC option informs the local router's peer that the local router can receive packets with compression. If the peer indicates that it, too, can receive packets with compression, then PFC is negotiated. If PFC is successfully negotiated, the local router can receive packets with either 2-byte (uncompressed) or 1-byte (compressed) protocol fields.

To monitor the configuration, issue the **show interfaces *interface-name*** command. Configured options are displayed in the **link flags** field for the physical interface. Successfully negotiated options are displayed in the **flags** field for the logical interface. In this example, both ACFC and PFC are configured, but neither compression feature has been successfully negotiated.

```
user@router# run show interfaces so-0/1/1
Physical interface: so-0/1/1, Enabled, Physical link is Up
  Interface index: 133, SNMP ifIndex: 27
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC3,
  Loopback: None, FCS: 16,
  Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : No-Keepalives ACFC PFC
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpIs:
Not-configured
  CHAP state: Not-configured
  CoS queues   : 4 supported
  Last flapped : 2004-12-29 10:49:32 PST (00:18:35 ago)
  Input rate    : 0 bps (0 pps)
  Output rate   : 0 bps (0 pps)
  SONET alarms  : None
  SONET defects : None
  Logical interface so-0/1/1.0 (Index 68) (SNMP ifIndex 169)
    Flags: Point-To-Point SNMP-Traps ACFC Encapsulation: PPP
    Protocol inet, MTU: 4470
    Flags: None
```

Addresses, Flags: Is-Preferred Is-Primary
Destination: 3.3.3/24, Local: 3.3.3.2, Broadcast: 3.3.3.255

Configuring the Interface Speed

You can configure the interface speed on the following interfaces:

- Configuring the Speed of Management Ethernet Interfaces on M Series and T Series Routers on page 132
- Configuring the Speed of Gigabit Ethernet Interfaces on J Series Routers on page 133
- Configuring the Speed of Fast Ethernet Interfaces on page 133
- Configuring the Speed of Tri-Rate Ethernet Copper Interfaces on page 133
- Configuring the Speed of SONET/SDH Interfaces on page 134

Configuring the Speed of Management Ethernet Interfaces on M Series and T Series Routers

By default, the M Series and T Series routers management Ethernet interface autonegotiates whether to operate at 10 megabits per second (Mbps) or 100 Mbps. All other interfaces automatically choose the correct speed based on the PIC type and whether the PIC is configured to operate in multiplexed mode (using the **no-concatenate** statement in the **[edit chassis]** configuration hierarchy, as described in the *Junos OS System Basics Configuration Guide*).



NOTE: For M Series, MX Series, and most T Series routers, the management Ethernet interface is **fxp0**. For TX Matrix Plus routers and T1600 routers configured in a routing matrix, the management Ethernet interface is **em0**.



NOTE: Automated scripts that you have developed for standalone T1600 routers (T1600 routers that are not in a routing matrix) might contain references to the **fxp0** management Ethernet interface. Before reusing the scripts on T1600 routers in a routing matrix, edit the command lines that reference the **fxp0** management Ethernet interface so that the commands reference the **em0** management Ethernet interface instead.

To configure the management Ethernet interface to operate at 10 Mbps or 100 Mbps, include the **speed** statement at the **[edit interfaces fxp0]** or **[edit interfaces em0]** hierarchy level:

```
[edit interfaces (fxp0 | em0)]
(10m | 100m);
```

For information about configuring the link mode, see *Configuring the Link Characteristics on Ethernet Interfaces*.



NOTE: The **fxp0** interface does not support CoS.

Configuring the Speed of Gigabit Ethernet Interfaces on J Series Routers

By default, Gigabit Ethernet interfaces (both built-in and PIMs) for J Series routers autonegotiate whether to operate at 10 megabits per second (Mbps), 100 Mbps, or 1000 Mbps.

To configure a J Series Gigabit Ethernet interface to operate at 10 Mbps, 100 Mbps, or 1000 Mbps, include the **speed** statement at the **[edit interfaces ge-pim/0/port]** hierarchy level:

```
[edit interfaces ge-pim/0/port]
  speed (10m | 100m | 1g);
```

For information about configuring the link mode, see *Configuring the Link Characteristics on Ethernet Interfaces*.

Configuring the Speed of Fast Ethernet Interfaces

By default, both of the built-in Fast Ethernet ports on the M7i router FIC autonegotiate whether to operate at 10 Mbps or 100 Mbps. All other interfaces automatically choose the correct speed based on the PIC type and whether the PIC is configured to operate in multiplexed mode (using the **no-concatenate** statement at the **[edit chassis]** hierarchy level, as described in the *Junos OS System Basics Configuration Guide*).

If the link partner does not support autonegotiation, configure either Fast Ethernet port manually to match its link partner's speed and link mode. When the link mode is configured, autonegotiation is disabled.



NOTE: When you manually configure Fast Ethernet interfaces on the M Series and T Series routers, link mode and speed must both be configured. If both these values are not configured, the router uses autonegotiation for the link and ignores the user-configured settings.

To configure a Fast Ethernet port on the FIC to operate at 10 Mbps or 100 Mbps, include the **speed** statement at the **[edit interfaces fe-fpc/pic/port]** hierarchy level:

```
[edit interfaces fe-fpc/pic/port]
  speed (10m | 100m);
```

For information about configuring the link mode, see *Configuring the Link Characteristics on Ethernet Interfaces*.

Configuring the Speed of Tri-Rate Ethernet Copper Interfaces

By default, the Tri-Rate Ethernet copper interfaces on MX Series routers operate at 1 Gbps. Tri-Rate Ethernet copper interfaces can also be configured to operate at 10 Mbps, 100 Mbps, or 1 Gbps.



NOTE: When you configure the Tri-Rate Ethernet copper interface to operate at 1 Gbps, autonegotiation must be enabled.



NOTE: Half-duplex mode is not supported on Tri-Rate Ethernet copper interfaces. When you include the **speed** statement, you must include the **link-mode full-duplex** statement at the same hierarchy level.

To configure a Tri-Rate Ethernet copper interface to operate at 10 Mbps, 100 Mbps, or 1 Gbps, include the **speed** statement at the **[edit interfaces ge-fpc/pic/port]** hierarchy level:

```
[edit interfaces ge-fpc/pic/port]
speed (10m | 100m | 1g);
```

For information about configuring the link mode, see *Configuring the Link Characteristics on Ethernet Interfaces*.

Configuring the Speed of SONET/SDH Interfaces

You can configure the speed of SONET/SDH interfaces on next-generation SONET/SDH Type 1 and Type 2 PICs with SFP. The speed you select is dependent upon whether the PIC is in concatenated or nonconcatenated mode. In concatenated mode, the bandwidth of the interface is in a single channel. In nonconcatenated mode, the PIC operates in channelized (multiplexed) mode.

Table 21 on page 134 shows the mode combinations for the next-generation SONET/SDH Type 1 PICs with SFP.

Table 21: Type 1 PIC Mode Combinations

PIC	Mode	Speed Configuration	Default Mode
2-port OC3	2xOC3 concatenated	<i>fpc/pic/0 speed oc3</i>	concatenated
4-port OC3	1xOC12 concatenated	<i>fpc/pic/0 speed oc12</i>	—
	1xOC12 nonconcatenated	<i>fpc/pic/0:0 speed oc3</i>	nonconcatenated
	4xOC3 concatenated	<i>fpc/pic/port speed oc3</i>	concatenated
1-port OC12	1xOC12 concatenated	<i>fpc/pic/0 speed oc12</i>	concatenated
	1xOC12 nonconcatenated	<i>fpc/pic/0:0 speed oc3</i>	nonconcatenated
	1xOC3 concatenated	<i>fpc/pic/0 speed oc3</i>	—

Table 22 on page 135 shows the mode combinations for the next-generation SONET/SDH Type 2 PICs with SFP.

Table 22: Type 2 PIC Mode Combinations

PIC	Mode	Speed Configuration	Default Mode
1-port OC48, IQ and IQE	1xOC48 concatenated	<i>fpc/pic/0 speed oc48</i>	concatenated
	1xOC48 nonconcatenated	<i>fpc/pic/0:0 speed oc12</i>	nonconcatenated
	1xOC12 concatenated	<i>fpc/pic/0 speed oc12</i>	—
	1xOC12 nonconcatenated	<i>fpc/pic/0 0 speed oc3</i>	—
	1xOC3 concatenated	<i>fpc/pic/0 speed oc3</i>	—
4-port OC12, IQ and IQE	1xOC48 concatenated	<i>fpc/pic/0 speed oc48</i>	—
	1xOC48 nonconcatenated	<i>fpc/pic/0:0 speed oc12</i>	nonconcatenated
	1xOC12 nonconcatenated	<i>fpc/pic/0 speed oc3</i>	—
	4xOC12 concatenated	<i>fpc/pic/port speed oc3 oc12</i>	concatenated
4-port OC3, IQ and IQE	1xOC12 concatenated	<i>fpc/pic/0 speed oc12</i>	—
	1xOC12 nonconcatenated	<i>fpc/pic/0:0 speed oc3</i>	nonconcatenated
	4xOC3 concatenated	<i>fpc/pic/port speed oc3</i>	concatenated

By default, SONET/SDH PICs operate in concatenated mode. To specify interface speed in concatenated mode, include the **speed** statement with options at the **[edit interfaces so-fpc/pic/port]** hierarchy level:

```
[edit interfaces so-fpc/pic/port]
speed (oc3 | oc12 | oc48);
```

For example, each port of the 4-port OC12 PIC can be configured to be in OC3 or OC12 speed independently when this PIC is in 4xOC12 concatenated mode.

To specify interface speed in nonconcatenated mode, include the **speed** statement at the **[edit interfaces so-fpc/pic/port.channel]** hierarchy level:

```
[edit interfaces so-fpc/pic/port.channel]
speed (oc3 | oc12);
```

To configure the PIC to operate in channelized (multiplexed) mode, include the **no-concatenate** statement at the **[edit chassis fpc slot-number pic pic-number]** hierarchy level.

For more information about using the **no-concatenate** statement, see the [Junos OS System Basics Configuration Guide](#).

Configuring Keepalives

By default, physical interfaces configured with Cisco HDLC or PPP encapsulation send keepalive packets at 10-second intervals. The Frame Relay term for keepalives is LMI packets; the Junos OS supports both ANSI T1.617 Annex D LMIs and ITU Q933 Annex A LMIs. On ATM networks, OAM cells perform the same function. You configure OAM cells at the logical interface level; for more information, see *Defining the ATM OAM F5 Loopback Cell Period*.

To disable the sending of keepalives on a physical interface, include the **no-keepalives** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]  
no-keepalives;
```

To disable the sending of keepalives on a physical interface configured with Cisco HDLC encapsulation for a translational cross-connection, include the **no-keepalives** statement at the **[edit interfaces *interface-name*]** hierarchy level along with the **encapsulation cisco-hdlc-tcc** statement:

```
[edit interfaces interface-name]  
encapsulation cisco-hdlc-tcc;  
no-keepalives;
```

For more information about translation cross-connections, see “Circuit and Translational Cross-Connects Overview” on page 229.

When you configure PPP over ATM or Multilink PPP over ATM encapsulation, you can enable or disable keepalives on the logical interface. For more information, see *Configuring PPP over ATM2 Encapsulation*.

To explicitly enable the sending of keepalives on a physical interface, include the **keepalives** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]  
keepalives;
```

To change one or more of the default keepalive values, include the appropriate option at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]  
keepalives <interval seconds> <down-count number> <up-count number>;
```

On interfaces configured with Cisco HDLC or PPP encapsulation, you can include the following three keepalive statements; note that Frame Relay encapsulation is not affected by these statements:

- **interval *seconds***—The time in seconds between successive keepalive requests. The range is from 1 second through 32767 seconds, with a default of 10 seconds.
- **down-count *number***—The number of keepalive packets a destination must fail to receive before the network takes a link down. The range is from 1 through 255, with a default of 3.

- **up-count *number***—The number of keepalive packets a destination must receive to change a link's status from down to up. The range is from 1 through 255, with a default of 1.



WARNING: If interface keepalives are configured on an interface that does not support the keepalives configuration statement (for example, 10-Gigabit Ethernet), the link layer may go down when the PIC is restarted. Avoid configuring the keepalives on interfaces that do not support the keepalives configuration statement.

For information about Frame Relay keepalive settings, see [Configuring Frame Relay Keepalives](#).

Configuring the Clock Source

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 on the interface. By default, the 19.44-MHz Stratum 3 reference clock generates the clock signal for all serial PICs (SONET/SDH) and Plesiochronous Digital Hierarchy (PDH) PICs. PDH PICs include DS3, E3, T1, and E1 PICs.

For example, interface A can transmit on interface A's received clock (external, loop timing) or the Stratum 3 clock (internal, line timing or normal timing). Interface A cannot use a clock from any other source. For interfaces such as SONET/SDH that can use different clock sources, you can configure the source of the transmit clock on each interface.

To set the clock source, include the **clocking** statement at the **[edit interfaces *interface-name*]** hierarchy level:

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

For information about clocking on channelized interfaces, see [Clock Sources on Channelized Interfaces](#). Also see [Configuring SONET/SDH Physical Interface Properties](#) and [Configuring the Channelized T3 Loop Timing](#). For information about configuring an external synchronization interface that can be used to synchronize the internal Stratum 3 clock to an external source on the M320 and M120 routers, see “Configuring an External Synchronization Interface” on page 64.

Configuring the Router as a DCE

By default, when you configure an interface with Frame Relay encapsulation, the router is assumed to be data terminal equipment (DTE). That is, the router is assumed to be at a terminal point on the network. To configure the router to be data circuit-terminating equipment (DCE), include the **dce** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]  
dce;
```

When you configure the router to be a DCE, keepalives are disabled by default.

For back-to-back Frame Relay connections, either disable the sending of keepalives on both sides of the connection, or configure one side of the connection as a DTE (the default Junos configuration) and the other as a DCE.

Configuring Receive and Transmit Leaky Bucket Properties

Congestion control is particularly difficult in high-speed networks with high volumes of traffic. When congestion occurs in such a network, it is usually too late to react. You can avoid congestion by regulating the flow of packets into your network. Smoother flows prevent bursts of packets from arriving at (or being transmitted from) the same interface and causing congestion.

For all interface types except ATM, channelized E1, E1, Fast Ethernet, Gigabit Ethernet, and channelized IQ, you can configure leaky bucket properties, which allow you to limit the amount of traffic received on and transmitted by a particular interface. You effectively specify what percentage of the interface's total capacity can be used to receive or transmit packets. You might want to set leaky bucket properties to limit the traffic flow from a link that is known to transmit high volumes of traffic.



NOTE: Instead of configuring leaky bucket properties, you can limit traffic flow by configuring policers. Policers work on all interfaces. For more information, see “Applying Policers” on page 199 and the [Junos OS Routing Policy Configuration Guide](#).

The leaky bucket is used at the host-network interface to allow packets into the network at a constant rate. Packets might be generated in a bursty manner, but after they pass through the leaky bucket, they enter the network evenly spaced. In some cases, you might want to allow short bursts of packets to enter the network without smoothing them out. By controlling the number of packets that can accumulate in the bucket, the **threshold** property controls burstiness. The maximum number of packets entering the network in t time units is **threshold + rate * t** .

By default, leaky buckets are disabled, and the interface can receive and transmit packets at the maximum line rate.

To configure leaky bucket properties, include one or both of the **receive-bucket** and **transmit-bucket** statements at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]  
receive-bucket {  
  overflow (discard | tag);  
  rate percentage;  
  threshold bytes;  
}  
transmit-bucket {  
  overflow discard;
```



```

    rate percentage;
    threshold bytes;
}

```

In the **rate** statement, specify the percentage of the interface line rate that is available to receive or transmit packets. The percentage can be a value from 0 (none of the interface line rate is available) to 100 (the maximum interface line rate is available). For example, when you set the line rate to 33, the interface receives or transmits at one-third of the maximum line rate.

In the **threshold** statement, specify the bucket threshold, which controls the burstiness of the leaky bucket mechanism. The larger the value, the more bursty the traffic, which means that over a very short time the interface can receive or transmit close to line rate, but the average over a longer time is at the configured bucket rate. The threshold can be a value from 0 through 65,535 bytes. For ease of entry, you can enter *number* either as a complete decimal number or as a decimal number followed by the abbreviation **k** (1,000). For example, the entry **threshold 2k** corresponds to a threshold of 2,000 bytes.

In the **overflow** statement, specify how to handle packets that exceed the threshold:

- **tag** (receive bucket only)—Tag, count, and process received packets that exceed the threshold.
- **discard**—Discard received packets that exceed the threshold. No counting is done.

Configuring Accounting for the Physical Interface

Juniper Networks routers and switches can collect various kinds of data about traffic passing through the router and switch. You can set up one or more *accounting profiles* that specify some common characteristics of this data, including the following:

- The fields used in the accounting records
- The number of files that the router or switch retains before discarding, and the number of bytes per file
- The polling period that the system uses to record the data

You configure the profiles and define a unique name for each profile using statements at the **[edit accounting-options]** hierarchy level. There are two types of accounting profiles: interface profiles and filter profiles. You configure interface profiles by including the **interface-profile** statement at the **[edit accounting-options]** hierarchy level. You configure filter profiles by including the **filter-profile** statement at the **[edit accounting-options]** hierarchy level. For more information, see the [Junos OS Network Management Configuration Guide](#).

You apply filter profiles by including the **accounting-profile** statement at the **[edit firewall filter *filter-name*]** and **[edit firewall family *family* filter *filter-name*]** hierarchy levels. For more information, see the [Junos OS Routing Policy Configuration Guide](#).

Applying an Accounting Profile to the Physical Interface

To enable accounting on an interface, include the **accounting-profile** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]  
  accounting-profile name;
```

You can also reference profiles by logical unit; for more information, see “Configuring Accounting for the Logical Interface” on page 165.

Example: Applying an Accounting Profile to the Physical Interface

Configure an accounting profile for an interface and apply it to a physical interface:

```
[edit]  
accounting-options {  
  file if_stats {  
    size 4m files 10 transfer-interval 15;  
    archive-sites {  
      "ftp://login:password@host/path";  
    }  
  }  
  interface-profile if_profile {  
    interval 15;  
    file if_stats {  
      fields {  
        input-bytes;  
        output-bytes;  
        input-packets;  
        output-packets;  
        input-errors;  
        output-errors;  
      }  
    }  
  }  
}  
[edit interfaces ge-1/0/1]  
  accounting-profile if_profile;
```

Interface Diagnostics

You can use two diagnostic tools to test the physical layer connections of interfaces: loopback testing and bit error rate test (BERT) testing. Loopback testing enables you to verify the connectivity of a circuit. BERT testing enables you to identify poor signal quality on a circuit. This section contains the following topics:

- Configuring Loopback Testing on page 141
- Interface Diagnostics on page 143

Configuring Loopback Testing

Loopback testing allows you to verify the connectivity of a circuit. You can configure any of the following interfaces to execute a loopback test: Aggregated Ethernet, Fast Ethernet, Gigabit Ethernet, E1, E3, NxDSO, serial, SONET/SDH, T1, and T3.

The physical path of a network data circuit usually consists of segments interconnected by devices that repeat and regenerate the transmission signal. The transmit path on one device connects to the receive path on the next device. If a circuit fault occurs in the form of a line break or a signal corruption, you can isolate the problem by using a loopback test. Loopback tests allow you to isolate segments of the circuit and test them separately.

To do this, configure a *line loopback* on one of the routers. Instead of transmitting the signal toward the far-end device, the line loopback sends the signal back to the originating router. If the originating router receives back its own data link layer packets, you have verified that the problem is beyond the originating router. Next, configure a line loopback farther away from the local router. If this originating router does not receive its own data link layer packets, you can assume the problem is on one of the segments between the local router and the remote router's interface card. In this case, the next troubleshooting step is to configure a line loopback closer to the local router to find the source of the problem.

There are several types of loopback testing supported by the Junos OS, as follows:

- DCE local—Loops packets back on the local DCE.
- DCE remote—Loops packets back on the remote DCE.
- Local—Useful for troubleshooting physical PIC errors. Configuring local loopback on an interface allows transmission of packets to the channel service unit (CSU) and then to the circuit toward the far-end device. The interface receives its own transmission, which includes data and timing information, on the local router's PIC. The data received from the CSU is ignored. To test a local loopback, issue the **show interfaces *interface-name*** command. If PPP keepalives transmitted on the interface are received by the PIC, the **Device Flags** field contains the output **Loop-Detected**.
- Payload—Useful for troubleshooting the physical circuit problems between the local router and the remote router. A payload loopback loops data only (without clocking information) on the remote router's PIC. With payload loopback, overhead is recalculated.
- Remote—Useful for troubleshooting the physical circuit problems between the local router and the remote router. A remote loopback loops packets, including both data and timing information, back on the remote router's interface card. A router at one end of the circuit initiates a remote loopback toward its remote partner. When you configure a remote loopback, the packets received from the physical circuit and CSU are received by the interface. Those packets are then retransmitted by the PIC back toward the CSU and the circuit. This loopback tests all the intermediate transmission segments.

Table 23 on page 142 shows the loopback modes supported on the various interface types.

Table 23: Loopback Modes by Interface Type

Interface	Loopback Modes	Usage Guidelines
Aggregated Ethernet, Fast Ethernet, Gigabit Ethernet	Local	Configuring Ethernet Loopback Capability
Circuit Emulation E1	Local and remote	Configuring E1 Loopback Capability
Circuit Emulation T1	Local and remote	Configuring T1 Loopback Capability
E1 and E3	Local and remote	Configuring E1 Loopback Capability and Configuring E3 Loopback Capability
NxDSO	Payload	Configuring Channelized E1 IQ and IQE Interfaces, Configuring T1 and NxDSO Interfaces, Configuring Channelized OC12/STM4 IQ and IQE Interfaces (SONET Mode), Configuring Channelized STM1 IQ and IQE Interfaces, and Configuring Channelized T3 IQ Interfaces
Serial (V.35 and X.21)	Local and remote	"Configuring Serial Loopback Capability" on page 285
Serial (EIA-530)	DCE local, DCE remote, local, and remote	"Configuring Serial Loopback Capability" on page 285
SONET/SDH	Local and remote	Configuring SONET/SDH Physical Interface Properties
T1 and T3	Local, payload, and remote	Configuring T1 Loopback Capability and Configuring T3 Loopback Capability See also Configuring the T1 Remote Loopback Response

To configure loopback testing, include the **loopback** statement:

loopback mode;

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* aggregated-ether-options]
- [edit interfaces *interface-name* ds0-options]
- [edit interfaces *interface-name* e1-options]
- [edit interfaces *interface-name* e3-options]
- [edit interfaces *interface-name* fastether-options]
- [edit interfaces *interface-name* gigether-options]
- [edit interfaces *interface-name* serial-options]

- [edit interfaces *interface-name* sonet-options]
- [edit interfaces *interface-name* t1-options]
- [edit interfaces *interface-name* t3-options]

Interface Diagnostics

BERT allows you to troubleshoot problems by checking the quality of links. You can configure any of the following interfaces to execute a BERT when the interface receives a request to run this test: E1, E3, T1, T3; the channelized DS3, OC3, OC12, and STM1 interfaces; and the channelized DS3 IQ, E1 IQ, and OC12 IQ interfaces.

A BERT test requires a line loop to be in place on either the transmission devices or the far-end router. The local router generates a known bit pattern and sends it out the transmit path. The received pattern is then verified against the sent pattern. The higher the bit error rate of the received pattern, the worse the noise is on the physical circuit. As you move the position of the line loop increasingly downstream toward the far-end router, you can isolate the troubled portion of the link.

To configure BERT, you must configure the duration of the test, the bit pattern to send on the transmit path, and the error rate to monitor when the inbound pattern is received.

To configure the duration of the test, the pattern to send in the bit stream, and the error rate to include in the bit stream, include the **bert-period**, **bert-algorithm**, and **bert-error-rate** statements, respectively, at the [edit interfaces *interface-name interface-type-options*] hierarchy level:

```
[edit interfaces interface-name interface-type-options]
bert-algorithm algorithm;
bert-error-rate rate;
bert-period seconds;
```

By default, the BERT period is 10 seconds. You can configure the BERT period to last from 1 through 239 seconds on some PICs and from 1 through 240 seconds on other PICs.

rate is the bit error rate. This can be an integer from 0 through 7, which corresponds to a bit error rate from 10^{-0} (1 error per bit) to 10^{-7} (1 error per 10 million bits).

algorithm is the pattern to send in the bit stream. For a list of supported algorithms, enter a ? after the **bert-algorithm** statement; for example:

```
[edit interfaces t1-0/0/0 t1-options]
user@host# set bert-algorithm ?
Possible completions:
pseudo-2e11-o152      Pattern is 2^11 - 1 (per 0.152 standard)
pseudo-2e15-o151      Pattern is 2^15 - 1 (per 0.152 standard)
pseudo-2e20-o151      Pattern is 2^20 - 1 (per 0.151 standard)
pseudo-2e20-o153      Pattern is 2^20 - 1 (per 0.153 standard)
...
```

For specific hierarchy information, see the individual interface types.



NOTE: The 4-port E1 PIC supports only the following algorithms:

pseudo-2e11-o152	Pattern is $2^{11} - 1$ (per 0.152 standard)
pseudo-2e15-o151	Pattern is $2^{15} - 1$ (per 0.151 standard)
pseudo-2e20-o151	Pattern is $2^{20} - 1$ (per 0.151 standard)
pseudo-2e23-o151	Pattern is 2^{23} (per 0.151 standard)

When you issue the help command from the CLI, all BERT algorithm options are displayed, regardless of the PIC type, and no commit check is available. Unsupported patterns for a PIC type can be viewed in system log messages.



NOTE: The 12-port T1/E1 Circuit Emulation (CE) PIC supports only the following algorithms:

all-ones-repeating	Repeating one bits
all-zeros-repeating	Repeating zero bits
alternating-double-ones-zeros	Alternating pairs of ones and zeros
alternating-ones-zeros	Alternating ones and zeros
pseudo-2e11-o152	Pattern is $2^{11} - 1$ (per 0.152 standard)
pseudo-2e15-o151	Pattern is $2^{15} - 1$ (per 0.151 standard)
pseudo-2e20-o151	Pattern is $2^{20} - 1$ (per 0.151 standard)
pseudo-2e7	Pattern is $2^7 - 1$
pseudo-2e9-o153	Pattern is $2^9 - 1$ (per 0.153 standard)
repeating-1-in-4	1 bit in 4 is set
repeating-1-in-8	1 bit in 8 is set
repeating-3-in-24	3 bits in 24 are set

When you issue the help command from the CLI, all BERT algorithm options are displayed, regardless of the PIC type, and no commit check is available. Unsupported patterns for a PIC type can be viewed in system log messages.



NOTE: The IQE PICs support only the following algorithms:

all-ones-repeating	Repeating one bits
all-zeros-repeating	Repeating zero bits
alternating-double-ones-zeros	Alternating pairs of ones and zeros
alternating-ones-zeros	Alternating ones and zeros
pseudo-2e9-o153	Pattern is $2^9 - 1$ (per 0.153 (511 type) standard)
pseudo-2e11-o152	Pattern is $2^{11} - 1$ (per 0.152 and 0.153 (2047 type) standards)
pseudo-2e15-o151	Pattern is $2^{15} - 1$ (per 0.151 standard)
pseudo-2e20-o151	Pattern is $2^{20} - 1$ (per 0.151 standard)
pseudo-2e20-o153	Pattern is $2^{20} - 1$ (per 0.153 standard)
pseudo-2e23-o151	Pattern is $2^{23} - 1$ (per 0.151 standard)
repeating-1-in-4	1 bit in 4 is set
repeating-1-in-8	1 bit in 8 is set
repeating-3-in-24	3 bits in 24 are set

When you issue the help command from the CLI, all BERT algorithm options are displayed, regardless of the PIC type, and no commit check is available. Unsupported patterns for a PIC type can be viewed in system log messages.

Table 24 on page 145 shows the BERT capabilities for various interface types.

Table 24: BERT Capabilities by Interface Type

Interface	T1 BERT	T3 BERT	Comments
12-port T1/E1 Circuit Emulation	Yes (ports 0–11)		<ul style="list-style-type: none"> Limited algorithms
4-port Channelized OC3/STM1 Circuit Emulation	Yes (port 0–3)		<ul style="list-style-type: none"> Limited algorithms
E1 or T1	Yes (port 0–3)	Yes (port 0–3)	<ul style="list-style-type: none"> Single port at a time Limited algorithms
E3 or T3	Yes (port 0–3)	Yes (port 0–3)	<ul style="list-style-type: none"> Single port at a time
Channelized OC12	N/A	Yes (channel 0–11)	<ul style="list-style-type: none"> Single channel at a time Limited algorithms No bit count
Channelized STM1	Yes (channel 0–62)	N/A	<ul style="list-style-type: none"> Multiple channels Only one algorithm No error insert No bit count
Channelized T3 and Multichannel T3	Yes (channel 0–27)	Yes (port 0–3 on channel 0)	<ul style="list-style-type: none"> Multiple ports and channels Limited algorithms for T1 No error insert for T1 No bit count for T1

These limitations do not apply to channelized IQ interfaces. For information about BERT capabilities on channelized IQ interfaces, see [Channelized IQ and IQE Interfaces Properties](#).

Starting and Stopping a BERT Test

Before you can start the BERT test, you must disable the interface. To do this, include the **disable** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
disable;
```

After you configure the BERT properties and commit the configuration, begin the test by issuing the **test interface *interface-name* *interface-type* bert-start** operational mode command:

```
user@host> test interface interface-name interface-type bert-start
```

The test runs for the duration you specify with the **bert-period** statement. If you wish to terminate the test sooner, issue the **test interface *interface-name* *interface-type* bert-stop** command:

```
user@host> test interface interface-name interface-type-bert-stop
```

For example:

```
user@host> test interface t3-1/2/0 t3-bert-start
user@host> test interface t3-1/2/0 t3-bert-stop
```

To view the results of the BERT test, issue the **show interfaces extensive | find BERT** command:

```
user@host> show interfaces interface-name extensive | find BERT
```

For more information about running and evaluating the results of the BERT procedure, see the [Junos OS System Basics and Services Command Reference](#).



NOTE: To exchange BERT patterns between a local router and a remote router, include the **loopback remote** statement in the interface configuration at the remote end of the link. From the local router, issue the **test interface** command.

Example: Configuring Bit Error Rate Testing

Configure a BERT test on a T3 interface. In this example, the run duration lasts for 120 seconds. The configured error rate is 0, which corresponds to a bit error rate of 10^{-0} (1 error per bit). The configured bit pattern of **all-ones-repeating** means that every bit the interface sends is a set to a value of 1.

```
[edit interfaces]
t3-1/2/0 {
  t3-options {
    bert algorithm all-ones-repeating;
    bert-error-rate 0;
    bert-period 120;
  }
}
```

Tracing Operations of an Individual Router Interface

To trace the operations of individual router interfaces, include the **traceoptions** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
traceoptions {
  flag flag <disable>;
}
```

You can specify the following interface tracing flags:

- **all**—Trace all interface operations.
- **event**—Trace all interface events.
- **ipc**—Trace all interface interprocess communication (IPC) messages.
- **media**—Trace all interface media changes.

The interfaces **traceoptions** statement does not support a trace file. The logging is done by the kernel, so the tracing information is placed in the system **syslog** files.

For more information about trace operations, see “Tracing Operations of the Interface Process” on page 248.

Damping Interface Transitions

By default, when an interface changes from being up to being down, or from down to up, this transition is advertised immediately to the hardware and the Junos OS. In some situations—for example, when an interface is connected to an add-drop multiplexer (ADM) or wavelength-division multiplexer (WDM), or to protect against SONET/SDH framer holes—you might want to damp interface transitions. This means not advertising the interface’s transition until a certain period of time has passed, called the *hold-time*. When you have damped interface transitions and the interface goes from up to down, the interface is not advertised to the rest of the system as being down until it has remained down for the hold-time period. Similarly when an interface goes from down to up, it is not advertised as being up until it has remained up for the hold-time period.

To damp interface transitions, include the **hold-time** statement at the **[edit interfaces interface-name]** hierarchy level:

```
[edit interfaces interface-name]
hold-time up milliseconds down milliseconds;
```

The time can be a value from 0 through 4,294,967,295 milliseconds. The default value is 0, which means that interface transitions are not damped. The Junos OS advertises the transition within 100 milliseconds of the time value you specify.

For most Ethernet interfaces, hold timers are implemented using a 1-second polling algorithm. For 1-port, 2-port, and 4-port Gigabit Ethernet interfaces with small form-factor pluggable transceivers (SFPs), hold timers are interrupt-driven.



NOTE: The **hold-time** option is not available for controller interfaces.

Configuring Multiservice Physical Interface Properties

The adaptive services (AS), collector, monitoring services, and monitoring services II interfaces are multiservice interfaces specifically designed to enable IP services. To configure multiservice physical interface properties on the collector, monitoring services, and AS interfaces, include the **multiservice-options** statement:

```
multiservice-options {
  (core-dump | no-core-dump);
  (syslog | no-syslog);
  flow-control-options {
    down-on-flow-control;
    dump-on-flow-control;
    reset-on-flow-control;
  }
}
```

```
}
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *cp-fpc/pic/port*]
- [edit interfaces *mo-fpc/pic/port*]
- [edit interfaces *sp-fpc/pic/port*]

For more information about the services interfaces, see the *Junos OS Services Interfaces Configuration Guide*.

Enabling or Disabling SNMP Notifications on Physical Interfaces

By default, Simple Network Management Protocol (SNMP) notifications are sent when the state of an interface or a connection changes. To explicitly enable these notifications on the physical interface, include the **traps** statement at the [edit interfaces *interface-name*] hierarchy level. To disable these notifications on the physical interface, include the **no-traps** statement at the [edit interfaces *interface-name*] hierarchy level:

```
[edit interfaces interface-name]  
(traps | no-traps);
```



NOTE: Gigabit Ethernet interfaces on J Series routers do not support SNMP.

Enabling Unidirectional Traffic Flow on Physical Interfaces

By default, physical interfaces are bidirectional; that is, they both transmit and receive traffic. You can configure unidirectional link mode on a 10-Gigabit Ethernet interface that creates two new physical interfaces that are unidirectional. The new transmit-only and receive-only interfaces operate independently, but both are subordinate to the original parent interface.

The unidirectional interfaces enable the configuration of a unidirectional link topology. Unidirectional links are useful for applications such as broadband video services where almost all traffic flow is in one direction, from the provider to the user. Unidirectional link mode conserves bandwidth by enabling it to be differentially dedicated to transmit and receive interfaces. In addition, unidirectional link mode conserves ports for such applications because the transmit-only and receive-only interfaces act independently. Each can be connected to different routers, for example, reducing the total number of ports required.

To enable unidirectional link mode on a physical interface, include the **unidirectional** statement at the [edit interfaces *interface-name*] hierarchy level:

```
[edit interfaces interface-name]  
unidirectional;
```



NOTE: Unidirectional link mode is currently supported on only the following hardware:

- 4-port 10-Gigabit Ethernet DPC on the MX960 router
- 10-Gigabit Ethernet IQ2 PIC and 10-Gigabit Ethernet IQ2E PIC on the T Series router

The transmit-only interface is always operationally up. The operational status of the receive-only interface depends only on local faults; it is independent of remote faults and of the status of the transmit-only interface.

On the parent interface, you can configure attributes common to both interfaces, such as clocking, framing, `gigether-options`, and `sonet-options`. On each of the unidirectional interfaces, you can configure encapsulation, MAC address, MTU size, and logical interfaces.

Unidirectional interfaces support IP and IPv6. Packet forwarding takes place by means of static routes and static ARP entries, which you can configure independently on both unidirectional interfaces.

Only transmit statistics are reported on the transmit-only interface (and shown as zero on the receive-only interface). Only receive statistics are reported on the receive-only interface (and shown as zero on the transmit-only interface). Both transmit and receive statistics are reported on the parent interface.

Disabling a Physical Interface

You can disable a physical interface, marking it as being down, without removing the interface configuration statements from the configuration. To do this, include the **disable** statement at the `[edit interfaces interface-name]` hierarchy level:

```
[edit interfaces interface-name]  
disable;
```



CAUTION: Dynamic subscribers and logical interfaces use physical interfaces for connection to the network. The Junos OS allows you to set the interface to disable and commit the change while dynamic subscribers and logical interfaces are still active. This action results in the loss of all subscriber connections on the interface. Use care when disabling interfaces.



NOTE: On the router, when you use the `disable` statement at the `edit interfaces` hierarchy level, depending on the PIC type, the interface might or might not turn off the laser. Older PIC transceivers do not support turning off the laser, but newer Gigabit Ethernet PICs with SFP and XFP transceivers do support it and the laser will be turned off when the interface is disabled.



WARNING: Do not stare into the laser beam or view it directly with optical instruments even if the interface has been disabled.

Example: Disabling a Physical Interface

Disable a physical interface:

```
[edit interfaces]
so-1/1/0 {
  mtu 8000;
  clocking internal;
  encapsulation ppp;
  sonet-options {
    fcs 16;
  }
  unit 0 {
    family inet {
      address 172.16.0.0/12 {
        destination 172.16.0.4;
      }
    }
  }
}
[edit interfaces]
user@host# set so-1/1/0 disable
[edit interfaces]
user@host# show so-1/1/0
so-1/1/0 {
  disable;# Interface is marked as disabled
  mtu 8000;
  clocking internal;
  encapsulation ppp;
  sonet-options {
    fcs 16;
  }
  unit 0 {
    family inet {
      address 172.16.0.0 {
        destination 172.16.0.3;
      }
    }
  }
}
```

CHAPTER 4

Configuring Logical Interface Properties

- Logical Interfaces Configuration Properties Overview on page 151
- Logical Interfaces Configuration Statements on page 152
- Logical Interfaces Statements List on page 155
- Specifying the Logical Interface Number on page 162
- Configuring Logical System Interface Properties on page 163
- Adding a Logical Unit Description to the Configuration on page 164
- Configuring a Point-to-Point Connection on page 164
- Configuring a Multipoint Connection on page 165
- Configuring Accounting for the Logical Interface on page 165
- Configuring the Interface Bandwidth on page 166
- Enabling or Disabling SNMP Notifications on Logical Interfaces on page 167
- Configuring Interface Encapsulation on Logical Interfaces on page 168
- Configuring the LCP Configure-Request Maximum Sent on page 169
- Configuring the NCP Configure-Request Maximum Sent on page 169
- Configuring the PPP Restart Timers on page 170
- Configuring the PPP Clear Loop Detected Timer on page 170
- Configuring Dynamic Profiles for PPP on page 171
- Configuring PPP CHAP Authentication on page 171
- Configuring PPP PAP Authentication on page 172
- Configuring Dynamic Call Admission Control on page 174
- Disabling a Logical Interface on page 175

Logical Interfaces Configuration Properties Overview

For a physical interface device to function, you must configure at least one logical interface on that device. For each logical interface, you must specify the protocol family that the interface supports. You can also configure other logical interface properties. These vary by Physical Interface Card (PIC) and encapsulation type, but include the IP address of the interface, and whether the interface supports multicast traffic, data-link connection

identifiers (DLCIs), virtual channel identifiers (VCIs) and virtual path identifiers (VPIs), and traffic shaping.

Logical Interfaces Configuration Statements

To configure logical interface properties, include the following statements:

```
unit logical-unit-number {
  accept-source-mac {
    mac-address mac-address {
      policer {
        input cos-policer-name;
        output cos-policer-name;
      }
    }
  }
  accounting-profile name;
  allow-any-vci;
  atm-scheduler-map (map-name | default);
  backup-options {
    interface interface-name;
  }
  bandwidth rate;
  cell-bundle-size cells;
  clear-dont-fragment-bit;
  compression {
    rtp {
      f-max-period number;
      queues [ queue-numbers ];
      port {
        minimum port-number;
        maximum port-number;
      }
    }
  }
  compression-device interface-name;
  copy-tos-to-outer-ip-header;
  demux-destination family;
  demux-source family;
  demux-options {
    underlying-interface interface-name;
  }
  description text;
  dial-options {
    l2tp-interface-id name;
    (dedicated | shared);
  }
  dialer-options {
    activation-delay seconds;
    callback;
    callback-wait-period time;
    deactivation-delay seconds;
    dial-string [ dial-string-numbers ];
    idle-timeout seconds;
    incoming-map {
```

```

    caller (caller-id | accept-all);
    initial-route-check seconds;
    load-interval seconds;
    load-threshold number;
    pool pool-name;
    redial-delay time;
    watch-list {
        [ routes ];
    }
}
}
disable;
disable-mlppp-inner-ppp-pfc;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
    activation-priority priority;
    bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold plp1 cells;
filter filter-name;
fragment-threshold bytes;
inner-vlan-id-range start start-id end end-id;
input-vlan-map {
    inner-tag-protocol-id;
    inner-vlan-id;
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    tag-protocol-id tpid;
    vlan-id number;
}
interleave-fragments;
inverse-arp;
link-layer-overhead percent;
layer2-policer {
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
    output-three-color policer-name;
}
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
    up-count cells;
    down-count cells;
}
oam-period (seconds | disable);
output-vlan-map {
    inner-tag-protocol-id;
    inner-vlan-id;
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    tag-protocol-id tpid;

```

```
    vlan-id number;
  }
  passive-monitor-mode;
  peer-unit unit-number;
  plp-to-clp;
  point-to-point;
  ppp-options {
    chap {
      access-profile name;
      default-chap-secret name;
      local-name name;
      passive;
    }
    compression {
      acfc;
      pfc;
    }
    dynamic-profile profile-name;
    lcp-restart-timer milliseconds;
    loopback-clear-timer seconds;
    ncp-restart-timer milliseconds;
    pap {
      default-pap-password password;
      local-name name;
      local-password password;
      passive;
    }
  }
  pppoe-options {
    access-concentrator name;
    auto-reconnect seconds;
    (client | server);
    service-name name;
    underlying-interface interface-name;
  }
  proxy-arp;
  service-domain (inside | outside);
  shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst length);
    queue-length number;
  }
  short-sequence;
  transmit-weight number;
  (traps | no-traps);
  trunk-bandwidth rate;
  trunk-id number;
  tunnel {
    backup-destination address;
    destination address;
    key number;
    routing-instance {
      destination routing-instance-name;
    }
    source source-address;
    ttl number;
  }
}
```



```

vci vpi-identifier.vci-identifier;
vci-range start start-vci end end-vci;
vpi vpi-identifier;
vlan-id number;
vlan-id-range number-number;
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
family family {
    [ family-statements ];
}
}

```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name*]
- [edit logical-systems *logical-system-name* interfaces *interface-name*]

For information about interface-specific logical properties, see Table 25 on page 155.

Logical Interfaces Statements List

Table 25 on page 155 lists statements that you can use to configure logical interfaces.

Table 25: Statements for Logical Interface Properties

Statement	Interface Types	Usage Guidelines
access-profile <i>name</i>	ATM2 IQ interfaces	"Configuring PPP PAP Authentication" on page 172
accept-source-mac	Gigabit Ethernet intelligent queuing (IQ) interfaces	Configuring Gigabit Ethernet Policers
accounting-profile <i>name</i>	All	"Configuring Accounting for the Logical Interface" on page 165
activation-delay <i>seconds</i>	ISDN interfaces	ISDN Interfaces Overview
activation-priority <i>priority</i>	Fast Ethernet and Gigabit Ethernet interfaces, ISDN BRI interfaces, and serial interfaces with PPP or Frame Relay encapsulation on J4350 and J6350 Services Routers supporting voice over IP with the TGM550 media gateway module	"Configuring Dynamic Call Admission Control" on page 174
adaptive-shapers <i>adaptive-shaper-name</i>	Frame Relay interfaces on J Series routers	Junos OS Class of Service Configuration Guide
allow-any-vci	Asynchronous Transfer Mode (ATM) interfaces	Configuring ATM Interface Encapsulation
atm-scheduler-map (<i>map-name</i> default)	ATM2 IQ interfaces	Configuring ATM2 IQ VC Tunnel CoS Components

Table 25: Statements for Logical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
backup-destination address	Encryption interfaces	<i>Junos OS Class of Service Configuration Guide</i>
backup-options	J Series routers ISDN interfaces	Configuring ISDN Logical Interface Properties
bandwidth rate	All interfaces, except multilink and aggregated	"Configuring the Interface Bandwidth" on page 166
bearer-bandwidth-limit kilobits-per-second	Fast Ethernet and Gigabit Ethernet interfaces, ISDN BRI interfaces, and serial interfaces with PPP or Frame Relay encapsulation on J4350 and J6350 Services Routers supporting voice over IP with the TGM550 media gateway module	"Configuring Dynamic Call Admission Control" on page 174
cbr rate	ATM interfaces	Defining the ATM Traffic-Shaping Profile
cell-bundle-size cells	ATM2 IQ interfaces	Configuring the Layer 2 Circuit Cell-Relay Cell Maximum
clear-dont-fragment-bit	Adaptive services interfaces	<i>Junos OS Services Interfaces Configuration Guide</i>
compression	AS PIC or MultiServices PIC link services IQ interfaces (lsq) and voice services interfaces	<i>Junos OS Services Interfaces Configuration Guide</i>
compression-device interface-name	J Series routers E1 and T1 interfaces.	<i>Junos OS Services Interfaces Configuration Guide</i>
copy-tos-to-outer-ip-header	GRE tunnel interfaces	<i>Junos OS Class of Service Configuration Guide</i>
deactivation-delay seconds	ISDN interfaces	ISDN Interfaces Overview
demux-destination family	IP demux interfaces	"Configuring an IP Demux Underlying Interface" on page 259
demux-options family	IP demux interfaces	"Specifying the Demux Underlying Interface" on page 261
demux-source family	IP demux interfaces	"Configuring an IP Demux Underlying Interface" on page 259
description text	All	"Adding a Logical Unit Description to the Configuration" on page 164
destination (address routing-instance-name)	Encryption generic routing encapsulation (GRE) tunnel, and IP tunnel interfaces	<i>Junos OS Services Interfaces Configuration Guide</i>

Table 25: Statements for Logical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
dialer-options	J Series routers ISDN interfaces	Configuring ISDN Physical Interface Properties
disable	All	"Disabling a Logical Interface" on page 175
disable-mlppp-inner-ppp-pfc	MLPPP interfaces	Junos OS Services Interfaces Configuration Guide
dlci <i>dlci-identifier</i>	Point-to-point interfaces with Frame Relay encapsulation	Configuring Frame Relay DLCIs
drop-timeout <i>milliseconds</i>	Multilink interfaces	Junos OS Services Interfaces Configuration Guide
dynamic-call-admission-control	Fast Ethernet and Gigabit Ethernet interfaces, ISDN BRI interfaces, and serial interfaces with PPP or Frame Relay encapsulation on J4350 and J6350 Services Routers supporting voice over IP with the TGM550 media gateway module	"Configuring Dynamic Call Admission Control" on page 174
dynamic-profile <i>profile-name</i>	1-Gigabit Ethernet and 10-Gigabit Ethernet interfaces configured with PPP over Ethernet on M120 and M320 routers	Junos Subscriber Access Configuration Guide
encapsulation <i>type</i>	All interfaces, except aggregated SONET/SDH and loopback	"Configuring the Encapsulation on a Logical Interface" on page 168
epd-threshold <i>cells</i>	ATM2 IQ interfaces	Configuring the ATM2 IQ EPD Threshold
f-max-period <i>number</i>	AS PIC or MultiServices link services IQ interfaces (lsq-) and voice services interfaces	Junos OS Services Interfaces Configuration Guide
family	All	"Configuring the Protocol Family" on page 180
fragment-threshold <i>bytes</i>	Multilink interfaces	Junos OS Services Interfaces Configuration Guide
frame-relay <i>map-name</i> default)	Frame Relay Interfaces on J Series routers	Junos OS Services Interfaces Configuration Guide and Junos OS Class of Service Configuration Guide
idle-timeout	ISDN interfaces	Configuring ISDN Logical Interface Properties
initial-route-check <i>seconds</i>	ISDN interfaces	Configuring ISDN Logical Interface Properties

Table 25: Statements for Logical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
inner-tag-protocol-id	Gigabit Ethernet IQ interfaces	802.1Q VLANs Overview
inner-vlan-id	Gigabit Ethernet IQ interfaces	802.1Q VLANs Overview
inner-vlan-id-range	Gigabit Ethernet, 10-Gigabit Ethernet, and aggregated Ethernet IQ interfaces	“Configuring ATM-to-Ethernet Interworking” on page 236
input	AS PIC or MultiServices link services	Junos OS Services Interfaces Configuration Guide
input-policer <i>policer-name</i>	For 1-Gigabit Ethernet and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces on M Series and T Series routers	Junos OS Services Interfaces Configuration Guide and Configuring Gigabit Ethernet Two-Color and Tricolor Policers
input-three-color <i>policer-name</i>	For 1-Gigabit Ethernet and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces on M Series and T Series routers	Junos OS Class of Service Configuration Guide and Configuring Gigabit Ethernet Two-Color and Tricolor Policers
input-vlan-map	Gigabit Ethernet IQ interfaces	Stacking and Rewriting Gigabit Ethernet VLAN Tags Overview
interleave-fragments	Link services interfaces	Junos OS Services Interfaces Configuration Guide
inverse-arp	Interfaces with ATM and Frame Relay encapsulation	Configuring Inverse ATM1 or ATM2 ARP and Configuring Inverse Frame Relay ARP
key <i>number</i>	GRE tunnel interfaces on Adaptive Services PICs	Junos OS Services Interfaces Configuration Guide
layer2-policer	1-Gigabit Ethernet and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces	Configuring Gigabit Ethernet Two-Color and Tricolor Policers
lcp-restart-timer	Interfaces with PPP encapsulation	“Configuring the PPP Restart Timers” on page 170
l2tp-interface-id <i>name</i>	Adaptive services interfaces	Junos OS Services Interfaces Configuration Guide
link-layer-overhead <i>percent</i>	AS PIC or MultiServices link services IQ interfaces (lsq)	Junos OS Services Interfaces Configuration Guide
load-threshold <i>number</i>	ISDN interfaces	Configuring ISDN Logical Interface Properties
local-name <i>name</i>	ATM2 IQ interfaces	“Configuring PPP CHAP Authentication” on page 171 and “Configuring PPP PAP Authentication” on page 172

Table 25: Statements for Logical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
loss-priority-maps	Frame Relay interfaces on J Series routers	<i>Junos OS Services Interfaces Configuration Guide</i> and <i>Junos OS Class of Service Configuration Guide</i>
mac-address <i>mac-address</i>	Gigabit Ethernet interfaces and Gigabit Ethernet IQ and IQE interfaces with small form-factor pluggable transceivers (SFPs) (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router)	Configuring Gigabit Ethernet Policers
minimum-links <i>number</i>	Multilink interfaces	<i>Junos OS Services Interfaces Configuration Guide</i>
mrru <i>bytes</i>	Multilink interfaces	<i>Junos OS Services Interfaces Configuration Guide</i>
multicast-dlci <i>dlci-identifier</i>	Point-to-multipoint Frame Relay interfaces	Configuring Frame Relay DLCIs
multicast-vc vpi-identifier <i>vci-identifier</i>	Point-to-multipoint ATM1 and ATM2 IQ interfaces	Configuring the ATM OAM F5 Loopback Cell Threshold
multilink-max-classes <i>number</i>	AS PIC or MultiServices link services IQ interfaces (lsq-)	<i>Junos OS Services Interfaces Configuration Guide</i>
multipoint	All	"Configuring a Multipoint Connection" on page 165
ncp-restart-timer	Interfaces with PPP encapsulation	"Configuring the PPP Restart Timers" on page 170
oam-liveness	ATM1 and ATM2 IQ interfaces	Configuring the ATM OAM F5 Loopback Cell Threshold
oam-period (disable <i>seconds</i>)	ATM1 and ATM2 IQ interfaces	Defining the ATM OAM F5 Loopback Cell Period
output	All	<i>Junos OS Services Interfaces Configuration Guide</i>
output-policer <i>policer-name</i>	For 1-Gigabit Ethernet and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces on M Series and T Series routers	<i>Junos OS Class of Service Configuration Guide</i> and Configuring Gigabit Ethernet Two-Color and Tricolor Policers
output-three-color <i>policer-name</i>	For 1-Gigabit Ethernet and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces on M Series and T Series routers	<i>Junos OS Class of Service Configuration Guide</i> and Configuring Gigabit Ethernet Two-Color and Tricolor Policers

Table 25: Statements for Logical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
output-vlan-map	Gigabit Ethernet IQ interfaces	Stacking and Rewriting Gigabit Ethernet VLAN Tags Overview
passive (CHAP)	ATM2 IQ interfaces	"Configuring PPP CHAP Authentication" on page 171
passive (PAP)	ATM2 IQ interfaces	"Configuring PPP PAP Authentication" on page 172
passive-monitor-mode	SONET/SDH interfaces	Enabling Passive Monitoring on SONET/SDH Interfaces
peer-unit <i>unit-number</i>	Logical tunnel interfaces	Junos OS Services Interfaces Configuration Guide
pfc	Interfaces with PPP, PPP CCC, or PPP TCC encapsulation	"Configuring the PPP Protocol Field Compression" on page 130
plp1 cells	ATM2 IQ interfaces	Configuring the ATM2 IQ EPD Threshold
plp-to-clp	ATM2 IQ interfaces	Configuring ATM2 IQ VC Tunnel CoS Components
point-to-point	All	"Configuring a Point-to-Point Connection" on page 164
policer	Gigabit Ethernet and Gigabit Ethernet IQ and IQE PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router)	Configuring Gigabit Ethernet Policers
pop	Gigabit Ethernet IQ interfaces	Removing a VLAN Tag
pop-pop	Gigabit Ethernet IQ interfaces	Removing the Outer and Inner VLAN Tags
pop-swap	Gigabit Ethernet IQ interfaces	Removing the Outer VLAN Tag and Rewriting the Inner VLAN Tag
port	AS PIC or MultiServices or MultiServices link services IQ interfaces (lsq) and voice services interfaces	Junos OS Services Interfaces Configuration Guide
ppp-options	Interfaces with PPP, PPP CCC, or PPP TCC encapsulation	"Configuring PPP CHAP Authentication" on page 171 and "Configuring PPP PAP Authentication" on page 172
proxy-arp	Ethernet interfaces	Configuring Unrestricted Proxy ARP
push	Gigabit Ethernet IQ interfaces	Stacking a VLAN Tag

Table 25: Statements for Logical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
push-push	Gigabit Ethernet IQ interfaces	Stacking Two VLAN Tags
queue-length <i>number</i>	ATM1 interfaces	Configuring the ATM1 Queue Length
queues [<i>queue-numbers</i>]	AS PIC or MultiServices link services IQ interfaces (lsq) and voice services interfaces	Junos OS Services Interfaces Configuration Guide
routing-instance	GRE tunnel and IP tunnel interfaces	Junos OS Services Interfaces Configuration Guide
rtp	AS PIC or MultiServices link services IQ interfaces (lsq) and voice services interfaces	Junos OS Services Interfaces Configuration Guide
rtvbr <i>peak rate sustained rate burst length</i>	ATM2 interfaces	Defining the ATM Traffic-Shaping Profile
service-domain (inside outside)	Adaptive services interfaces	Junos OS Services Interfaces Configuration Guide
shaping	ATM1 and ATM2 IQ interfaces	Defining the ATM Traffic-Shaping Profile
short-sequence	Multilink interfaces	Junos OS Services Interfaces Configuration Guide
source <i>source-address</i>	Encryption, GRE tunnel, and IP tunnel interfaces	Junos OS Services Interfaces Configuration Guide
swap	Gigabit Ethernet IQ interfaces	Configuring Frames with Particular TPIDs to Be Processed as Tagged Frames
swap-push	Gigabit Ethernet IQ interfaces	Rewriting a VLAN Tag and Adding a New Tag
swap-swap	Gigabit Ethernet IQ interfaces	Rewriting the Inner and Outer VLAN Tags
tag-protocol-id <i>tpid</i>	Gigabit Ethernet and Gigabit Ethernet IQ and IQE PICs with SFPs (except the 10-port Gigabit Ethernet PIC, Aggregated Ethernet with Gigabit Ethernet IQ interfaces, and the built-in Gigabit Ethernet port on the M71 router)	Rewriting the VLAN Tag on Tagged Frames
transmit-weight <i>number</i>	ATM2 IQ interfaces	Configuring the ATM2 IQ Transmission Weight
(traps no-traps)	All	"Enabling or Disabling SNMP Notifications on Logical Interfaces" on page 167

Table 25: Statements for Logical Interface Properties (*continued*)

Statement	Interface Types	Usage Guidelines
trunk-bandwidth rate	ATM2 IQ interfaces	Configuring Layer 2 Circuit Trunk Mode Scheduling
trunk-id number	ATM2 IQ interfaces	Configuring Layer 2 Circuit Transport Mode
ttl number	GRE tunnel and IP tunnel interfaces	Junos OS Services Interfaces Configuration Guide
tunnel	Encryption, GRE tunnel, and IP tunnel interfaces	Junos OS Services Interfaces Configuration Guide
underlying-interface	IP demux interfaces	"Specifying the Demux Underlying Interface" on page 261
vbr peak rate sustained rate burst length	ATM interfaces	Defining the ATM Traffic-Shaping Profile
vci vpi-identifier vci-identifier	ATM1 and ATM2 IQ point-to-point interfaces	Configuring a Point-to-Point ATM1 or ATM2 IQ Connection
vci-range	ATM2 IQ interfaces	"Configuring ATM-to-Ethernet Interworking" on page 236
vpi vpi-identifier	ATM1 and ATM2 IQ point-to-point interfaces	Configuring a Point-to-Point ATM1 or ATM2 IQ Connection
vlan-id number	Fast Ethernet, Gigabit Ethernet, and Gigabit Ethernet IQ interfaces and aggregated Ethernet using Gigabit Ethernet IQ interfaces	Binding VLAN IDs to Logical Interfaces and Rewriting the VLAN Tag on Tagged Frames
vlan-tags inner tpidvlan-id outer tpidvlan-id	Gigabit Ethernet IQ interfaces	Configuring Dual VLAN Tags
watch-list	ISDN interfaces	Configuring ISDN Logical Interface Properties

Specifying the Logical Interface Number

Each logical interface must have a logical unit number. The logical unit number corresponds to the logical unit part of the interface name. For more information, see "Interface Naming Overview" on page 48.

Point-to-Point Protocol (PPP), Cisco High-level Data Link Control (HDLC), and Ethernet circuit cross-connect (CCC) encapsulations support only a single logical interface, whose logical unit number must be 0. Frame Relay and ATM encapsulations support multiple logical interfaces, so you can configure one or more logical unit numbers.

You specify the logical unit number by including the **unit** statement:


```

unit logical-unit-number {
  ...
}

```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name*]
- [edit logical-systems *logical-system-name* interfaces *interface-name*]

The logical unit number can be in the range 0 through 65,535 for demux and PPPoE static interfaces only. The logical unit number can be in the range 0 through 16,385 for all other static interface types.

Configuring Logical System Interface Properties

With Junos OS, you can partition a single physical router into multiple logical devices that perform independent routing tasks. Because logical systems perform a subset of the tasks once handled by the physical router, logical systems offer an effective way to maximize the use of a single router.

You can include the following logical system statements:

```

[edit logical-systems logical-system-name]
interfaces interface-name {
  unit logical-unit-number {
    logical-interface-statements;
  }
}
policy-options {
  policy-options-statements;
}
protocols {
  protocols-statements;
}
routing-instances {
  routing-instances-statements;
}
routing-options {
  routing-options-statements;
}

```

For an overview of logical systems, see the [Junos OS Feature Guides](#). For detailed information about logical system configuration, see the [Junos OS Routing Protocols Configuration Guide](#). For information about configuring peer relationships between logical systems, see [Junos OS Services Interfaces Configuration Guide](#).

To configure interface properties of a logical system, you must include the following statements at the [edit logical-systems *logical-system-name*] hierarchy level:

```

[edit logical-systems logical-system-name]
interfaces interface-name {
  unit logical-unit-number {
    logical-interface-statements;
  }
}

```

```
}
```

Example: Configuring Logical System Interface Properties

Configure a logical system's interface properties:

```
[edit interfaces t3-0/0/1]
description "Physical interface to be partitioned into multiple logical systems";
[edit logical-systems l-on-t3-0/0/1]
interfaces t3-0/0/1 {
  unit 1 {
    family inet {
      address 10.0.0.1/32 {
        destination 10.0.0.2;
      }
    }
  }
}
```

Adding a Logical Unit Description to the Configuration

You can include a text description of each logical unit in the configuration file. Any descriptive text you include is displayed in the output of the **show interfaces** commands, and is also exposed in the **ifAlias** Management Information Base (MIB) object. It has no impact on the interface's configuration. To add a text description, include the **description** statement:

```
description text;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]**

The description can be a single line of text. If the text contains spaces, enclose it in quotation marks.



NOTE: You can configure the extended DHCP relay to include the interface description in the option 82 Agent Circuit ID suboption. See “Enabling and Disabling Insertion of Option 82 Information” in the *Junos OS Subscriber Access Configuration Guide*.

For information about describing physical interfaces, see “Adding an Interface Description to the Configuration” on page 104.

Configuring a Point-to-Point Connection

By default, all interfaces are assumed to be point-to-point connections. You must ensure that the maximum transmission unit (MTU) sizes on both sides of the connection are the same.

For all interfaces except aggregated Ethernet, Fast Ethernet, and Gigabit Ethernet, you can explicitly configure an interface to be a point-to-point connection by including the **point-to-point** statement:

point-to-point;

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Configuring a Multipoint Connection

By default, all interfaces are assumed to be point-to-point connections. To configure an interface to be a multipoint connection, include the **multipoint** statement:

multipoint;

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Configuring Accounting for the Logical Interface

Juniper Networks routers or switches can collect various kinds of data about traffic passing through the router or switch. You can set up one or more *accounting profiles* that specify some common characteristics of this data, including the following:

- The fields used in the accounting records
- The number of files that the router or switch retains before discarding, and the number of bytes per file
- The period that the system uses to record the data

You configure the profiles and define a unique name for each profile using statements at the [edit **accounting-options**] hierarchy level. There are two types of accounting profiles: interface profiles and filter profiles. You configure interface profiles by including the **interface-profile** statement at the [edit **accounting-options**] hierarchy level. You configure filter profiles by including the **filter-profile** statement at the [edit **accounting-options**] hierarchy level. For more information, see the [Junos OS Network Management Configuration Guide](#).

You apply filter profiles by including the **accounting-profile** statement at the [edit **firewall filter** *filter-name*] and [edit **firewall family** *family* filter *filter-name*] hierarchy levels. For more information, see the [Junos OS Routing Policy Configuration Guide](#).

Applying an Accounting Profile to the Logical Interface

To enable accounting on a logical interface, include the **accounting-profile** statement:

```
accounting-profile name;
```

You can include this statement at the following hierarchy level:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**

You can also reference profiles for the physical interface; for more information, see “Configuring Accounting for the Physical Interface” on page 139.

Example: Applying an Accounting Profile to the Logical Interface

Configure an accounting profile for an interface and apply it to a logical interface:

```
[edit]
accounting-options {
  file if_stats {
    size 4m files 10 transfer-interval 15;
    archive-sites {
      "ftp://login:password@host/path";
    }
  }
}
interface-profile if_profile {
  interval 15;
  file if_stats {
    fields {
      input-bytes;
      output-bytes;
      input-packets;
      output-packets;
      input-errors;
      output-errors;
    }
  }
}
[edit interfaces ge-1/0/1 unit 1]
accounting-profile if_profile;
```

To reference profiles by physical interface, see “Applying an Accounting Profile to the Physical Interface” on page 140. For information about configuring a firewall filter accounting profile, see the *Junos OS Routing Policy Configuration Guide*.

Configuring the Interface Bandwidth

By default, the Junos OS uses the physical interface’s speed for the MIB-II object, **ifSpeed**. You can configure the logical unit to populate the **ifSpeed** variable by configuring a bandwidth value for the logical interface. The **bandwidth** statement sets an informational-only parameter; you cannot adjust the actual bandwidth of an interface with this statement.



NOTE: We recommend that you be careful when setting this value. Any interface bandwidth value that you configure using the **bandwidth** statement affects how the interface cost is calculated for a dynamic routing protocol, such as OSPF. By default, the interface cost for a dynamic routing protocol is calculated using the following formula:

$$\text{cost} = \text{reference-bandwidth} / \text{bandwidth},$$

where bandwidth is the physical interface speed. However, if you specify a value for bandwidth using the **bandwidth** statement, that value is used to calculate the interface cost, rather than the actual physical interface bandwidth.

To configure the bandwidth value for a logical interface, include the **bandwidth** statement:

```
bandwidth rate;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

rate is the peak rate, in bps or cps. You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation **k** (1000), **m** (1,000,000), or **g** (1,000,000,000). You can also specify a value in cells per second by entering a decimal number followed by the abbreviation **c**; values expressed in cells per second are converted to bits per second using the formula 1 cps = 384 bps. The value can be any positive integer. The **bandwidth** statement is valid for all logical interfaces, except multilink interfaces.

Enabling or Disabling SNMP Notifications on Logical Interfaces

By default, Simple Network Management Protocol (SNMP) notifications are sent when the state of an interface or a connection changes. To explicitly enable these notifications on the logical interface, include the **traps** statement; to disable these notifications on the logical interface, include the **no-traps** statement:

```
(traps | no-traps);
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]



NOTE: Gigabit Ethernet interfaces on J Series routers do not support SNMP.

Configuring Interface Encapsulation on Logical Interfaces

PPP encapsulation is the default encapsulation type for physical interfaces. You need not configure encapsulation for any physical interfaces that support PPP encapsulation. If you do not configure encapsulation, PPP is used by default. For physical interfaces that do not support PPP encapsulation, you must configure an encapsulation to use for packets transmitted on the interface. For more information about physical interface encapsulation, see “Configuring the Encapsulation on a Physical Interface” on page 116.

You can optionally configure an encapsulation on a logical interface, which is the encapsulation used within certain packet types.

Configuring the Encapsulation on a Logical Interface

Generally, you configure an interface's encapsulation at the **[edit interfaces *interface-name*]** hierarchy level. However, for some encapsulation types, such as Frame Relay, ATM, and Ethernet virtual local area network (VLAN) encapsulations, you can also configure the encapsulation type that is used inside the Frame Relay, ATM, or VLAN circuit itself. To do this, include the **encapsulation** statement:

```
encapsulation (atm-ccc-cell-relay | atm-ccc-vc-mux | atm-tcc-vc-mux | atm-cisco-nlpid  
| atm-mlppp-llc | atm-nlpid | atm-ppp-llc | atm-ppp-vc-mux | atm-snap | atm-tcc-snap  
| atm-vc-mux | ether-over-atm-llc | ether-vpls-over-atm-llc | ethernet |  
frame-relay-ether-type | frame-relay-ether-type-tcc | frame-relay-ccc | frame-relay-tcc  
| multilink-frame-relay-end-to-end | multilink-ppp | vlan-ccc | vlan-tcc | vlan-vpls);
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]**

Some of the ATM encapsulations are defined in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*.

The following restrictions apply to logical interface encapsulation:

- With the atm-nlpid, atm-cisco-nlpid, and atm-vc-mux encapsulations, you can configure the inet family only.
- With the CCC circuit encapsulations, you cannot configure a family on the logical interface.
- A logical interface cannot have frame-relay-ccc encapsulation unless the physical device also has frame-relay-ccc encapsulation.
- A logical interface cannot have frame-relay-tcc encapsulation unless the physical device also has frame-relay-tcc encapsulation. In addition, you must assign this logical interface a DLCI from 512 through 1022 and configure it as point-to-point.
- A logical interface cannot have frame-relay-ether-type or frame-relay-ether-type-tcc encapsulation unless the physical interface has flexible-frame-relay encapsulation and is on an IQ or IQE PIC.

- For frame-relay-ether-type-tcc encapsulation, you must assign this logical interface a DLCI from 512 through 1022.
- For interfaces that carry IP version 6 (IPv6) traffic, you cannot configure ether-over-atm-llc encapsulation.
- When you use ether-over-atm-llc encapsulation, you cannot configure multipoint interfaces.
- A logical interface cannot have vlan-ccc or vlan-vpls encapsulation unless the physical device also has vlan-ccc or vlan-vpls encapsulation, respectively. In addition, you must assign this logical interface a VLAN ID from 512 through 1023; if the VLAN ID is 511 or lower, it is subject to the normal destination filter lookups in addition to source address filtering. For more information, see [Configuring VLAN Encapsulation](#).
- You can create an ATM cell-relay circuit by configuring an entire ATM physical device or an individual virtual circuit (VC). When you configure an entire device, only cell-relay encapsulation is allowed on the logical interfaces. For more information, see [Configuring an ATM1 Cell-Relay Circuit](#).

For more information about ATM encapsulations, see [Configuring ATM Interface Encapsulation](#).

For more information about Frame Relay encapsulations, see [Configuring Frame Relay Interface Encapsulation](#).

For more information about multilink encapsulations, see the [Junos OS Services Interfaces Configuration Guide](#).

Configuring the LCP Configure-Request Maximum Sent

Link Control Protocol (LCP) Configure-Request is used to establish a link. You can configure the maximum number of LCP Configure-Requests to send. The router stops sending LCP Configure-Requests after the specified maximum number is sent. To configure the LCP Configure-Request maximum, use the **lcp-max-conf-req** statement at the **[edit interfaces *interface-name* unit *number* ppp-options]** hierarchy level. The *number* range is from 0 to 65,535; where 0 specifies no limit and the LCP Configure-Request is sent indefinitely.

Configuring the NCP Configure-Request Maximum Sent

Network Control Protocol (NCP) Configure-Request is used to establish a link. You can configure the maximum number of NCP Configure-Requests to send. The router stops sending NCP Configure-Requests after the specified maximum number is sent. To configure the NCP Configure-Request maximum, use the **ncp-max-conf-req** statement at the **[edit interfaces *interface-name* unit *number* ppp-options]** hierarchy level. The *number* range is from 0 to 65,535; where 0 specifies no limit and NCP Configure-Request is sent indefinitely.

Configuring the PPP Restart Timers

You can configure a restart timer for the Link Control Protocol (LCP) and Network Control Protocol (NCP) components of a PPP session. You can configure the LCP restart timer on interfaces with PPP, PPP TCC, PPP over Ethernet, PPP over ATM, and PPP over Frame Relay encapsulations. You can configure the NCP restart timer on interfaces with PPP and PPP TCC encapsulations and on multilink PPP bundle interfaces.

To configure the restart timer for the NCP component of a PPP session, include the **ncp-restart-timer** statement, and specify the number of milliseconds.

To configure the restart timer for the LCP component of a PPP session, include the **lcp-restart-timer** statement, and specify the number of milliseconds:

```
lcp-restart-timer milliseconds;  
ncp-restart-timer milliseconds;
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* ppp-options]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* ppp-options]

To monitor the configuration, issue the **show interfaces *interface-name*** command. Configured options are displayed in the **PPP parameters** field for the physical interface.

```
user@host> run show interfaces t1-0/0/0:1:1.0 detail  
Logical interface t1-0/0/0:1:1.0 (Index 67) (SNMP ifIndex 40)  
(Generation 156)  
Flags: Hardware-Down Device-Down Point-To-Point SNMP-Traps 0x4000  
Encapsulation: PPP  
PPP parameters:  
  LCP restart timer: 2000 msec  
  NCP restart timer: 2000 msec  
Protocol inet, MTU: 1500, Generation: 163, Route table: 0  
Flags: Protocol-Down  
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary  
Destination: 1.1.1/24, Local: 1.1.1.2, Broadcast: 1.1.1.255,
```

Configuring the PPP Clear Loop Detected Timer

When a Point-to-Point Protocol (PPP) session detects a loop, the loop detected flag is set. If the flag is not cleared by the protocol after the loopback is cleared, the clear loop detected timer clears the flag after the specified time has elapsed.

To configure the clear loop detected timer for the LCP component of a PPP session, include the **loopback-clear-timer** statement, and specify the number of seconds.

```
loopback-clear-timer seconds;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* ppp-options]

- `[edit logical-systems logical-system-name interfaces interface-name unit logical-unit-number ppp-options]`

To monitor the configuration, issue the `show interfaces interface-name extensive` command.

Configuring Dynamic Profiles for PPP

A dynamic profile acts as a template that enables you to create, update, or remove a configuration that includes attributes for client access (for example, interface or protocol) or service (for example, IGMP). Using these profiles you can consolidate all of the common attributes of a client (and eventually a group of clients) and apply the attributes simultaneously.

After they are created, the profiles reside in a profile library on the router. You can then use the **dynamic-profile** statement to attach profiles to interfaces. To assign a dynamic profile to a PPP interface, you can include the **dynamic-profile** statement at the `[edit interfaces interface-name unit logical-unit-number ppp-options]` hierarchy level:

```
[edit interfaces interface-name unit logical-unit-number ppp-options]
dynamic-profile profile-name;
```

To monitor the configuration, issue the `show interfaces interface-name` command.

For information about dynamic profiles, see Dynamic Profiles Overview in the *Junos Subscriber Access Configuration Guide*.

For information about creating dynamic profiles, see Configuring a Basic Dynamic Profile in the *Junos Subscriber Access Configuration Guide*.

For information about assigning a dynamic profile to a PPP interface, see Attaching Dynamic Profiles to Static PPP Subscriber Interfaces in the *Junos Subscriber Access Configuration Guide*.



NOTE: Dynamic profiles for PPP subscribers are supported only on PPPoE interfaces for this release.

Related Documentation

- [Configuring Dynamic Authentication for PPP Subscribers](#)

Configuring PPP CHAP Authentication

For interfaces with PPP encapsulation, you can configure interfaces to support the PPP Challenge Handshake Authentication Protocol (CHAP), as defined in RFC 1994, *PPP Challenge Handshake Authentication Protocol (CHAP)*. When you enable CHAP on an interface, the interface can authenticate its peer and can be authenticated by its peer.

For information about configuring CHAP, see “Configuring the PPP Challenge Handshake Authentication Protocol” on page 121.

Configuring PPP PAP Authentication

The Password Authentication Protocol (PAP) provides a simple method for the peer to establish its identity using a two-way handshake. This is done only upon initial link establishment.

After the link is established, an ID and password pair is repeatedly sent by the peer to the authenticator until authentication is acknowledged or the connection is terminated.

To configure PAP, you must create an access profile, configure tracing operations, and configure the logical and physical interfaces.

To configure PAP on a logical interface with PPP encapsulation, include the **pap** statement with options:

```
pap {  
  default-pap-password password;  
  local-name name;  
  local-password password;  
  passive;  
}
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

For more information about configuring PAP for physical interfaces, see “Configuring the PPP Password Authentication Protocol” on page 124. For information about configuring tracing operations for the PPP protocol, see “Tracing Operations of the pppd Process” on page 128.

On each logical interface with PPP encapsulation, you can perform the following tasks:

- Configuring a Default PAP Password on page 172
- Configuring the Local Name on page 173
- Configuring the Local Password on page 173
- Configuring Passive Mode on page 173

Configuring a Default PAP Password

The default PAP password is used when no matching PAP access profile exists, or if the PAP access profile name changes during PPP link negotiation.

To configure a default PAP password for an interface, include the **default-pap-password** statement:

```
default-pap-password password;
```

You can include the statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* ppp-options pap]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* ppp-options pap]

Configuring the Local Name

By default, when PAP is enabled on an interface, the interface uses the router's system hostname as the name sent in PAP request and response packets.

To configure the name the interface uses in PAP request and response packets, include the **local-name** statement:

```
local-name name;
```

You can include the statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* ppp-options pap]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* ppp-options pap]

Configuring the Local Password

You need to configure the password to be used for authentication.

To configure the host password for sending PAP requests, include the **local-password** statement:

```
local-password password;
```

You can include the statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* ppp-options pap]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* ppp-options pap]

Configuring Passive Mode

By default, when PAP is enabled on an interface, the interface expects authenticate-request packets from the peer. However, the interface can be configured to send authentication request packets to the peer by configuring PAP to operate in passive mode. In PAP passive mode, the interface sends the authenticate-request packets to the peer only if the interface receives the PAP option from the peer during LCP negotiation—in passive mode, the interface does not authenticate the peer.

To configure the interface to authenticate with PAP in passive mode, include the **passive** statement:

```
passive;
```

You can include the statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* ppp-options pap]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* ppp-options pap]

Configuring Dynamic Call Admission Control

Dynamic call admission control (CAC) provides enhanced control over WAN bandwidth. You can configure dynamic CAC on J4350 and J6350 Services Routers supporting voice over IP through the TGM550 media gateway module. It can be used with the following interfaces:

- Fast Ethernet and Gigabit Ethernet interfaces
- ISDN BRI interfaces
- Serial interfaces with PPP or Frame Relay encapsulation

When dynamic CAC is configured on an interface responsible for providing call bandwidth, the TGM550 informs the Media Gateway Controller (MGC) of the bandwidth limit available for voice packets on the interface and requests the MGC to block new calls when the bandwidth is exhausted.

Dynamic CAC is useful when a primary link becomes unavailable and a backup link with less bandwidth takes its place. Without dynamic CAC, the MGC cannot detect the switchover to the backup link or the resulting changes in network topology and available bandwidth. The MGC would continue to admit calls at the bandwidth of the primary link, causing network congestion and possible jitter, delay, and loss of calls.

To configure dynamic CAC for a logical interface, include the **dynamic-call-admission-control** statement, with options:

```
dynamic-call-admission-control {  
    activation-priority priority;  
    bearer-bandwidth-limit kilobits-per-second;  
}
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

bearer-bandwidth-limit *kilobits-per-second* is the dynamic CAC bearer bandwidth limit (BBL)—the maximum bandwidth available for voice traffic on the interface. The TGM550 reports the BBL to the MGC. When the call bandwidth exceeds the BBL, the MGC blocks new calls and alerts the user with a busy tone. The BBL range is from 0 through 9999. The default BBL is -1, which indicates that dynamic CAC is not configured on an interface.

activation-priority *priority* specifies the order in which interfaces are used for providing call bandwidth. The interface with the highest activation priority value is used as the

primary link for providing call bandwidth. If the primary link becomes unavailable, the TGM550 switches to the next active interface with the highest activation priority value, and so on. The activation priority value range is from 0 through 255. The default is 50.



NOTE: Dynamic CAC works in conjunction with the Avaya Communication Manager (CM) Call Admission Control: Bandwidth Limitation (CAC-BL) feature. If you configure dynamic CAC on WAN interfaces, you must also configure CAC-BL on Avaya CM. For more information about configuring CAC-BL, see the *Administrator Guide for Avaya Communication Manager*.

Example: Configuring Dynamic CAC

Configure dynamic CAC on a logical interface:

```
[edit]
interfaces {
  tl-4/0/0 {
    unit 0 {
      dynamic-call-admission-control {
        bearer-bandwidth-limit 900 kbps;
        activation-priority 75;
      }
    }
  }
}
```

Disabling a Logical Interface

You can unconfigure a logical interface, effectively disabling that interface, without removing the logical interface configuration statements from the configuration. To do this, include the **disable** statement:

```
disable;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

When an interface is disabled, a route (pointing to the reserved target “REJECT”) with the IP address of the interface and a 32-bit subnet mask is installed in the routing table. See *Routing Protocols*.

CHAPTER 5

Configuring Protocol Family and Interface Address Properties

- Protocol Family Configuration and Interface Address Statements on page 177
- Configuring the Protocol Family on page 180
- Configuring the Interface Address on page 182
- Configuring the Same IP Address on Multiple Interfaces on page 185
- Configuring ICCP for MC-LAG on page 187
- Configuring IPCP Options on page 187
- Configuring an Unnumbered Interface on page 190
- Setting the Protocol MTU on page 195
- Disabling the Removal of Address and Control Bytes on page 196
- Disabling the Transmission of Redirect Messages on an Interface on page 196
- Configuring Default, Primary, and Preferred Addresses and Interfaces on page 197
- Applying Policers on page 199
- Applying a Filter to an Interface on page 208
- Configuring Unicast RPF on page 212
- Enabling Source Class and Destination Class Usage on page 218
- Enabling Targeted Broadcast on page 225

Protocol Family Configuration and Interface Address Statements

For each logical interface, you must configure one or more protocol families. You can also configure interface address properties. To do this, include the following statements:

```
family family {  
    accounting {  
        destination-class-usage;  
        source-class-usage {  
            direction;  
        }  
    }  
    address address {  
        destination address;  
    }  
}
```

```

}
bundle interface-name;
filter {
    dialer filter-name;
    input filter-name;
    output filter-name;
    group filter-group-number;
}
interface-mode (access | trunk);
ipsec-sa sa-name;
keep-address-and-control;
mtu bytes;
multicast-only;
negotiate-address;
no-redirects;
policer {
    arp policer-template-name;
    input policer-template-name;
    output policer-template-name;
}
primary;
protocols [inet iso mpls];
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check <fail-filter filter-name>;
sampling {
    direction;
}
service {
    input {
        service-set service-set-name <service-filter filter-name>;
        post-service-filter filter-name;
    }
    output {
        service-set service-set-name <service-filter filter-name>;
    }
}
targeted-broadcast {
    forward-and-send-to-re;
    forward-only;
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
vlan-id number;
vlan-id-list [number number-number];
unnumbered-address interface-name destination address destination-profile
    profile-name;
address address {
    arp ip-address (mac | multicast-mac) mac-address <publish>;
    broadcast address;
    destination address;
    destination-profile name;
    eui-64;
    multipoint-destination address dlci dlci-identifier;
}

```



```

multipoint-destination address {
  epd-threshold cells;
  inverse-arp;
  oam-liveness {
    up-count cells;
    down-count cells;
  }
  oam-period (disable | seconds);
  shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
    burst length);
    queue-length number;
  }
  vci vpi-identifier.vci-identifier;
}
primary;
preferred;
(vrrp-group | vrrp-inet6-group) group-number {
  (accept-data | no-accept-data);
  advertise-interval seconds;
  authentication-type authentication;
  authentication-key key;
  fast-interval milliseconds;
  (preempt | no-preempt) {
    hold-time seconds;
  }
  priority-number number;
  track {
    priority-cost seconds;
    priority-hold-time interface-name {
      interface priority;
      bandwidth-threshold bits-per-second {
        priority;
      }
    }
  }
  route ip-address/mask routing-instance instance-name priority-cost cost;
}
virtual-address [ addresses ];
}
}

```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

For information about interface-specific protocol and address properties, see *Configuring T1 and NxDSO Interfaces*.

Configuring the Protocol Family

For each logical interface, you can configure one or more of the following protocols that run on the interface:

- **any**—Protocol-independent family used for Layer 2 packet filtering. This option is not supported on J Series routers.
- **bridge**—(M Series and T Series routers only) Configure only when the physical interface is configured with **ethernet-bridge** type encapsulation or when the logical interface is configured with **vlan-bridge** type encapsulation. You can optionally configure this protocol family for the logical interface on which you configure VPLS.
- **ccc**—Circuit cross-connect (CCC). You can configure this protocol family for the logical interface of CCC physical interfaces. When you use this encapsulation type, you can configure the **ccc** family only.
- **inet**—IP. You must configure this protocol family for the logical interface to support IP protocol traffic, including Open Shortest Path First (OSPF), Border Gateway Protocol (BGP), Internet Control Message Protocol (ICMP), and Internet Protocol Control Protocol (IPCP).
- **inet6**—IP version 6 (IPv6). You must configure this protocol family for the logical interface to support IPv6 protocol traffic, including Routing Information Protocol for IPv6 (RIPng), Intermediate System-to-Intermediate System (IS-IS), BGP, and Virtual Router Redundancy Protocol for IPv6 (VRRP). For more information about IPv6, see “IPv6 Overview” on page 181.
- **iso**—International Organization for Standardization (ISO). You must configure this protocol family for the logical interface to support IS-IS traffic.
- **mlfr-uni-nni**—Multilink Frame Relay (MLFR) FRF.16 user-to-network network-to-network (UNI NNI). You must configure this protocol or **mlfr-end-to-end** for the logical interface to support link services and voice services bundling.
- **mlfr-end-to-end**—Multilink Frame Relay end-to-end. You must configure this protocol or multilink Point-to-Point Protocol (MLPPP) for the logical interface to support multilink bundling.
- **mlppp**—MLPPP. You must configure this protocol (or **mlfr-end-to-end**) for the logical interface to support multilink bundling.
- **mpls**—Multiprotocol Label Switching (MPLS). You must configure this protocol family for the logical interface to participate in an MPLS path.
- **tcc**—Translational cross-connect (TCC). You can configure this protocol family for the logical interface of TCC physical interfaces.
- **tnp**—Trivial Network Protocol. This protocol is used to communicate between the Routing Engine and the router’s packet forwarding components. The Junos OS

automatically configures this protocol family on the router's internal interfaces only, as discussed in "Internal Ethernet Interface Overview" on page 251.

- **vpls**—M Series and T Series routers support Virtual Private LAN service (VPLS). You can optionally configure this protocol family for the logical interface on which you configure VPLS. VPLS provides an Ethernet-based point-to-multipoint Layer 2 VPN to connect customer edge (CE) routers across an MPLS backbone. When you configure a VPLS encapsulation type, the **family vpls** statement is assumed by default.

MX Series routers support dynamic profiles for VPLS pseudowires, VLAN identifier translation, and automatic bridge domain configuration.

For more information about VPLS, see the [Junos OS VPNs Configuration Guide](#) and the [Junos OS Feature Guides](#).

To configure the logical interface's protocol family, include the **family** statement, specifying the selected family. To configure more than one protocol **family** on a logical interface, include multiple **family** statements. Following is the minimum configuration:

```
family family {
  mtu size;
  multicast-only;
  no-redirects;
  primary;
  address address {
    destination address;
    broadcast address;
    preferred;
    primary;
  }
}
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

IPv6 Overview

IP version 4 (IPv4) has been widely deployed and used to network the Internet today. With the rapid growth of the Internet, enhancements to IPv4 are needed to support the influx of new subscribers, Internet-enabled devices, and applications. IPv6 is designed to enable the global expansion of the Internet.

IPv6 builds upon the functionality of IPv4, providing improvements to addressing, configuration and maintenance, and security.

IPv6 is defined in the following documents:

- RFC 2373, *IP Version 6 Addressing Architecture*
- RFC 2460, *Internet Protocol, Version 6 (IPv6)*

IPv4-to-IPv6 Transition

Implementing IPv6 requires a transition mechanism to allow interoperability between IPv6 nodes (both routers and hosts) and IPv4 nodes. The transition mechanism is the key factor in the successful deployment of IPv6. Because millions of IPv4 nodes already exist, upgrading every node to IPv6 at the same time is not feasible.

As a result, transition from IPv4 to IPv6 happens gradually, allowing nodes to be upgraded independently and without disruption to other nodes. While a gradual upgrade occurs, compatibility between IPv6 and IPv4 nodes becomes a requirement. Otherwise, an IPv6 node would not be able to communicate with an IPv4 node.

Transition mechanisms allow IPv6 and IPv4 nodes to coexist together in the same network, and make gradual upgrading possible. The transition mechanism supported by the Junos OS is tunneling. Tunnels allow IPv6 packets to be encapsulated into IPv4 headers and sent across an IPv4 infrastructure. For more information about configuring tunnels to support IPv4-to-IPv6 transition, see the *Junos OS Services Interfaces Configuration Guide*.

VRRP Properties

The Virtual Router Redundancy Protocol (VRRP) provides a much faster switchover to a backup router when the default router fails. Using VRRP, a backup router can take over a failed default router within a few seconds. This is done with minimum amount of VRRP traffic and without any interactions with the hosts.

For more information on VRRP properties, see the *Junos OS High Availability Configuration Guide*.

Configuring the Interface Address

You assign an address to an interface by specifying the address when configuring the protocol family. For the **inet** or **inet6** family, configure the interface IP address. For the **iso** family, configure one or more addresses for the loopback interface. For the **ccc**, **ethernet-switching**, **tcc**, **mpls**, **tnp**, and **vpls** families, you never configure an address.



NOTE: The point-to-point (PPP) address is taken from the loopback interface address that has the primary attribute. When the loopback interface is configured as an unnumbered interface, it takes the primary address from the donor interface.

To assign an address to an interface, include the **address** statement:

```
address address {  
    broadcast address;  
    destination address;  
    destination-profile name;  
    eui-64;  
    preferred;  
    primary;
```

```
}
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family *family*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

In the **address** statement, specify the network address of the interface.

For each address, you can optionally configure one or more of the following:

- Broadcast address for the interface subnet—Specify this in the **broadcast** statement; this applies only to Ethernet interfaces, such as the management interface **fxp0**, **em0**, or **me0** the Fast Ethernet interface, and the Gigabit Ethernet interface.
- Address of the remote side of the connection (for point-to-point interfaces only)—Specify this in the **destination** statement.
- PPP properties to the remote end—Specify this in the **destination-profile** statement. You define the profile at the [edit access group-profile *name* **ppp**] hierarchy level (for point-to-point interfaces only).
- Whether the router or switch automatically generates the host number portion of interface addresses—The **eui-64** statement applies only to interfaces that carry IPv6 traffic, in which the prefix length of the address is 64 bits or less, and the low-order 64 bits of the address are zero. This option does not apply to the loopback interface (**lo0**) because IPv6 addresses configured on the loopback interface must have a 128-bit prefix length.
- Whether this address is the preferred address—Each subnet on an interface has a preferred local address. If you configure more than one address on the same subnet, the preferred local address is chosen by default as the source address when you originate packets to destinations on the subnet. For more information about preferred addresses, see

By default, the preferred address is the lowest-numbered address on the subnet. To override the default and explicitly configure the preferred address, include the **preferred** statement when configuring the address.

- Whether this address is the primary address—Each interface has a primary local address. If an interface has more than one address, the primary local address is used by default as the source address when you originate packets out the interface where the destination gives no hint about the subnet (for example, some **ping** commands).

By default, the primary address on an interface is the lowest-numbered non-127 preferred address on the interface. To override the default and explicitly configure the preferred address, include the **primary** statement when configuring the address.

- Configuring Interface IPv4 Addresses on page 184
- Configuring Interface IPv6 Addresses on page 184

Configuring Interface IPv4 Addresses

You can configure router or switch interfaces with a 32-bit IP version 4 (IPv4) address and optionally with a destination prefix, sometimes called a *subnet mask*. An IPv4 address utilizes a 4-octet dotted decimal address syntax (for example, **192.16.1.1**). An IPv4 address with destination prefix utilizes a 4-octet dotted decimal address syntax appended with a destination prefix (for example, **192.16.1.1/30**).

To configure an IPv4 address on routers and switches running Junos OS, use the **edit interface *interface-name* unit *number* family inet address *a.b.c.d/nn*** statement at the **[edit interfaces]** hierarchy level.



NOTE: Juniper Networks routers and switches support /31 destination prefixes when used in point-to-point Ethernet configurations; however, they are not supported by many other devices, such as hosts, hubs, routers, or switches. You must determine if the peer system also supports /31 destination prefixes before configuration.

Configuring Interface IPv6 Addresses

You represent IP version 6 (IPv6) addresses in hexadecimal notation using a colon-separated list of 16-bit values.

You assign a 128-bit IPv6 address to an interface by including the **address** statement:

```
address aaaa:bbbb:...:zzzz/nn;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number* family inet6]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family inet6]**

The double colon (::) represents all bits set to 0, as shown in the following example:

```
interfaces fe-0/0/1 {  
  unit 0 {  
    family inet6 {  
      address fec0:1:1::2/64;  
    }  
  }  
}
```



NOTE: You must manually configure the router or switch advertisement and advertise the default prefix for autoconfiguration to work on a specific interface.

Related Documentation

- Configuring IPCP Options on page 187

- Configuring Default, Primary, and Preferred Addresses and Interfaces on page 197

Configuring the Same IP Address on Multiple Interfaces

By default, all interfaces are assumed to be point-to-point (PPP) interfaces. For all interfaces except aggregated Ethernet, Fast Ethernet, and Gigabit Ethernet, you can explicitly configure an interface to be a point-to-point connection.

You can configure the same IPv4 address on multiple physical interfaces. When you assign the same IPv4 address to multiple physical interfaces, the operational behavior of those interfaces differs, depending on whether they are implicitly or explicitly point-to-point. This topic describes how to configure the same IPv4 address on multiple interfaces and how to view their operational status after such a configuration has been committed.

To configure the same IPv4 address on one or more interfaces specify the same value for the *address* option in the **family inet** statement:

```
interfaces interface-name unit logical-unit-number family inet address address
```

You can include this statement at the following hierarchy level:

```
[edit interfaces interface-name unit logical-unit-number family inet]
```

The following examples show the sample configuration of assigning the same IPv4 address to implicitly and explicitly point-to-point interfaces, and their corresponding **show interfaces terse** command outputs to see their operational status.

Configuring same IPv4 address on implicitly PPP interfaces:

```
[edit]
user@host# show
ge-0/1/0 {
  unit 0 {
    family inet {
      address 200.1.1.1/24;
    }
  }
}

ge-3/0/1 {
  unit 0 {
    family inet {
      address 200.1.1.1/24;
    }
  }
}
```

The sample output shown below for the above configuration reveals that only **ge-0/1/0.0** was assigned the same IPv4 address **200.1.1.1/24** and its **link** state was **up**, while **ge-3/0/1.0** was not assigned the IPv4 address, though its **link** state was up, which means that it will be operational only when it gets a unique IPv4 address other than **200.1.1.1/24**.

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

Interface	Admin	Link	Proto	Local	Remote
ge-0/1/0		up	up		
ge-0/1/0.0		up	up	inet 200.1.1.1/24	
				multiservice	
ge-0/1/1		up	down		
ge-3/0/0		up	down		
ge-3/0/1		up	up		
ge-3/0/1.0		up	up	inet	
				multiservice	

Configuring same IPv4 address on explicitly PPP interfaces:

```
[edit]
user@host# show
so-0/0/0 {
  unit 0 {
    family inet {
      address 200.1.1.1/24;
    }
  }
}
so-0/0/3 {
  unit 0 {
    family inet {
      address 200.1.1.1/24;
    }
  }
}
```

The sample output shown below for the above configuration reveals that both **so-0/0/0.0** and **so-0/0/3.0** were assigned the same IPv4 address **200.1.1.1/24** and that their **link** states were down, which means that to make them operational at least one of them will have to be configured with a unique IPv4 address other than **200.1.1.1/24**.

show interfaces terse

user@host> show interfaces terse so*

Interface	Admin	Link	Proto	Local	Remote
so-0/0/0	up	up			
so-0/0/0.0	up	down	inet	200.1.1.1/24	
so-0/0/1	up	up			
so-0/0/2	up	down			
so-0/0/3	up	up			
so-0/0/3.0	up	down	inet	200.1.1.1/24	
so-1/1/0	up	down			
so-1/1/1	up	down			
so-1/1/2	up	up			
so-1/1/3	up	up			
so-2/0/0	up	up			
so-2/0/1	up	up			
so-2/0/2	up	up			
so-2/0/3	up	down			

- Related Documentation**
- [Configuring the Interface Address on page 182](#)
 - [family on page 441](#)

Configuring ICCP for MC-LAG

For multichassis link aggregation (MC-LAG), you must configure interchassis control (ICCP) to exchange information between two MC-LAG peers.

To enable ICCP, include the **iccp** statement at the **[edit protocols]** hierarchy level:

```
[edit protocols]
iccp {
  authentication-key string;
  local-ip-addr ipv4-address;
  peer ip-address {
    authentication-key string;
    liveness-detection {
      detection-time {
        threshold milliseconds;
      }
    }
    minimum-interval milliseconds;
    minimum-receive-interval milliseconds;
    multiplier number;
    no-adaptation;
    transmit-interval {
      minimum-interval milliseconds;
      threshold milliseconds;
    }
    version (1 | automatic);
  }
  local-ip-addr ipv4-address;
  redundancy-group-id-list [ redundancy-groups ];
  session-establishment-hold-time value;
}
session-establishment-hold-time value;
traceoptions;
}
```

The **local-ip-address** statement sets the source address. This could be a specified address or interface address. The **session-establishment-hold-time** statement determines whether a chassis takes over as the master at the ICCP session.

The **authentication-key** statement is provided by TCP Message Digest 5 (md5) option for an ICCP TCP session. The **redundancy-group-id-list** statement specifies the redundancy groups between ICCP peers and the **liveness-detection** hierarchy configures Bidirectional Forwarding Detection (BFD) protocol options.

Configuring IPCP Options

For interfaces with PPP encapsulation, you can configure IPCP to negotiate IP address assignments and to pass network-related information such as Windows Name Service (WINS) and Domain Name System (DNS) servers, as defined in RFC 1877, *PPP Internet Protocol Control Protocol Extensions for Name Server Addresses*.



NOTE: The Junos OS does not request name servers from the remote end; the software does, however, send name servers to the remote end if requested.

On the logical interface, the following PPP encapsulation types are supported:

- **atm-mlppp-llc**
- **atm-ppp-llc**
- **atm-ppp-vc-mux**
- **multilink-ppp**

When you enable a PPP interface, you can configure an IP address, enable the interface to negotiate an IP address assignment from the remote end, or allow the interface to be unnumbered. You can also assign a destination profile to the remote end. The destination profile includes PPP properties, such as primary and secondary DNS and NetBIOS Name Servers (NBNSs). These options are described in the following sections:

- [Configuring an IP Address for an Interface on page 188](#)
- [Negotiating an IP Address Assignment from the Remote End on page 188](#)
- [Configuring an Interface to Be Unnumbered on page 189](#)
- [Assigning a Destination Profile to the Remote End on page 189](#)

Configuring an IP Address for an Interface

You can configure an IP address for the interface by including the **address** statement in the configuration. For more information, see “Configuring the Interface Address” on page 182.

If you include the **address** statement in the configuration, you cannot include the **negotiate-address** or **unnumbered-address** statement in the configuration.

When you include the **address** statement in the interface configuration, you can assign PPP properties to the remote end, as shown in “Assigning a Destination Profile to the Remote End” on page 189.



NOTE: The option to negotiate an IP address is not allowed in MLFR and MFR encapsulations.

Negotiating an IP Address Assignment from the Remote End

To enable the interface to obtain an IP address from the remote end, include the **negotiate-address** statement:

```
negotiate-address;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family inet]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family inet]

If you include the **negotiate-address** statement in the configuration, you cannot include the **address** or **unnumbered-address** statement in the configuration.

Configuring an Interface to Be Unnumbered

To configure an interface to be unnumbered, include the **unnumbered-address** and **destination** statements in the configuration:

```
unnumbered-address interface-name destination address;
```

The **unnumbered-address** statement enables the local address to be derived from the specified interface. The interface name must include a logical unit number and must have a configured address (see “Configuring the Interface Address” on page 182). Specify the IP address of the remote interface with the **destination** statement.

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family inet]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family inet]

If you include the **unnumbered-address** statement in the configuration, you cannot include the **address** or **negotiate-address** statement in the interface configuration.

When you include the **unnumbered-address** statement in the interface configuration, you can assign PPP properties to the remote end, as shown in “Assigning a Destination Profile to the Remote End” on page 189.

Assigning a Destination Profile to the Remote End

When you include the **address** or **unnumbered-address** statement in the interface configuration, you can assign PPP properties to the remote end. To do this, include the **destination-profile** statement:

```
destination-profile name;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family inet address *address*]
- [edit interfaces *interface-name* unit *logical-unit-number* family inet unnumbered-address *interface-name*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family inet address *address*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family inet unnumbered-address *interface-name*]

The profile name is a PPP group profile. You define the profile by including the following statements at the **[edit access group-profile *name* ppp]** hierarchy level:

```
[edit access group-profile name ppp]
  framed-pool pool-id;
  interface-id interface-id;
  primary-dns primary-dns;
  primary-wins primary-win-server;
  secondary-dns secondary-dns;
  secondary-wins secondary-wins;
```

For more information about PPP group profiles, see the *Junos OS System Basics Configuration Guide*.

Configuring an Unnumbered Interface

When you need to conserve IP addresses, you can configure unnumbered interfaces. Setting up an unnumbered interface enables IP processing on the interface without assigning an explicit IP address to the interface. For IPv6, in which conserving addresses is not a major concern, you can configure unnumbered interfaces to share the same subnet across multiple interfaces. IPv6 unnumbered interfaces are only supported on Ethernet interfaces. The statements you use to configure an unnumbered interface depend on the type of interface you are configuring: a point-to-point interface or an Ethernet interface:

- Configuring an Unnumbered Point-to-Point Interface on page 190
- Configuring an Unnumbered Ethernet or Demux Interface on page 191

Configuring an Unnumbered Point-to-Point Interface

To configure an unnumbered point-to-point interface, configure the protocol family, but do not include the **address** statement:

```
family family;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]**



NOTE: For interfaces with PPP encapsulation, you can configure an unnumbered interface by including the **unnumbered-interface** statement in the configuration. For more information, see “Configuring IPCP Options” on page 187.

When configuring unnumbered interfaces, you must ensure that a source address is configured on some interface in the router. This address is the default address. We recommend that you do this by assigning an address to the loopback interface (**lo0**), as described in “Configuring the Loopback Interface” on page 267. If you configure an address

(other than a martian) on the **lo0** interface, that address is always the default address, which is preferable because the loopback interface is independent of any physical interfaces and therefore is always accessible.

Example: Configuring an Unnumbered Point-to-Point Interface

Configure an unnumbered point-to-point interface:

```
[edit]
interfaces {
  so-6/1/0 {
    unit 0 {
      family inet;
      family iso;
    }
  }
}
```

Configuring an Unnumbered Ethernet or Demux Interface

To configure an unnumbered Ethernet or demultiplexing interface, include the **unnumbered-address** statement in the configuration:

```
unnumbered-address interface-name;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family *family*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

For dynamic profiles, include the **unnumbered-address** statement at the following hierarchy levels:

- [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family*]
- [edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family *family*]

The **unnumbered-address** statement currently supports configuration of unnumbered demux interfaces only for the IPv4 address family. You can configure unnumbered Ethernet interfaces for both IPv4 and IPv6 address families.

The interface that you configure to be unnumbered *borrow*s an assigned IP address from another interface, and is referred to as the *borrower interface*. The interface from which the IP address is borrowed is referred to as the *donor interface*. In the **unnumbered-address** statement, *interface-name* specifies the donor interface. For an unnumbered Ethernet interface, the donor interface can be an Ethernet, ATM, SONET, or loopback interface that has a logical unit number and configured IP address and is not itself an unnumbered interface. For an unnumbered IP demultiplexing interface, the donor interface can be an Ethernet or loopback interface that has a logical unit number and configured IP address and is not itself an unnumbered interface. In addition, for either Ethernet or demux, the

donor interface and the borrower interface must be members of the same routing instance and the same logical system.

When you configure an unnumbered Ethernet or demux interface, the IP address of the donor interface becomes the source address in packets generated by the unnumbered interface.

You can configure a host route that points to an unnumbered Ethernet or demux interface. For information about host routes, see the [Junos OS MPLS Applications Configuration Guide](#).

For more information, see the following sections:

- [Configuring a Preferred Source Address for Unnumbered Ethernet or Demux Interfaces on page 192](#)
- [Configuring Static Routes on Unnumbered Ethernet Interfaces on page 193](#)
- [Restrictions for Configuring Unnumbered Ethernet Interfaces on page 193](#)
- [Example: Configuring an Unnumbered Ethernet Interface on page 194](#)
- [Example: Configuring the Preferred Source Address for an Unnumbered Ethernet Interface on page 194](#)
- [Example: Configuring an Unnumbered Ethernet Interface as the Next Hop for a Static Route on page 195](#)

For additional information about dynamic-profiles, see Dynamic Profiles Overview.

Configuring a Preferred Source Address for Unnumbered Ethernet or Demux Interfaces

When a loopback interface with multiple secondary IP addresses is configured as the donor interface for an unnumbered Ethernet or demux interface, you can optionally specify any one of the loopback interface's secondary addresses as the preferred source address for the unnumbered Ethernet or demux interface. This feature enables you to use an IP address other than the primary IP address on some of the unnumbered Ethernet or demux interfaces in your network.

To configure a secondary address on a loopback donor interface as the preferred source address for an unnumbered Ethernet or demux interface, include the **preferred-source-address** option in the **unnumbered-address** statement:

```
unnumbered-address interface-name <preferred-source-address address>;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family *family*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]
- [edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family*]
- [edit dynamic-profiles *profile-name* interfaces demux0 unit *logical-unit-number* family *family*]

The following considerations apply when you configure a preferred source address on an unnumbered Ethernet or demux interface:

- The **unnumbered-address** statement currently supports the configuration of a preferred source address only for the IPv4 address family for demux interfaces, and for IPv4 and IPv6 address families for Ethernet interfaces.
- If you do not specify the preferred source address, the router uses the default primary IP address of the donor interface.
- You cannot delete an address on a donor loopback interface while it is being used as the preferred source address for an unnumbered Ethernet or demux interface.
- The router uses the preferred source address, if configured for an unnumbered Ethernet or demux interface, in ARP requests and replies. ARP requests must match the preferred source address.

For a configuration example that illustrates this feature, see “Example: Configuring the Preferred Source Address for an Unnumbered Ethernet Interface” on page 194.

To display the preferred source address for an unnumbered Ethernet or demux interface, use the **show interfaces** operational mode command. For information about using this command, see the [Junos OS Interfaces Command Reference](#).

Configuring Static Routes on Unnumbered Ethernet Interfaces

You can configure static routes on an unnumbered Ethernet interface. To do so, you use the **qualified-next-hop** statement to specify the unnumbered Ethernet interface as the next-hop interface for a configured static route. This feature enables you to specify independent preferences and metrics for static routes on a next-hop basis.

For a configuration example that illustrates this feature, see “Example: Configuring an Unnumbered Ethernet Interface as the Next Hop for a Static Route” on page 195.

For information about how to specify an independent preference for a static route, see the [Junos OS Routing Protocols Configuration Guide](#).

Restrictions for Configuring Unnumbered Ethernet Interfaces

The following restrictions apply when you configure unnumbered Ethernet interfaces:

- The **unnumbered-address** statement currently supports the configuration of unnumbered Ethernet interfaces for IPv4 and IPv6 address families.
- You cannot assign an IP address to an Ethernet interface that is already configured as an unnumbered interface.
- The donor interface for an unnumbered Ethernet interface must have one or more configured IP addresses.
- The donor interface for an unnumbered Ethernet interfaced cannot be configured as unnumbered.
- An unnumbered Ethernet interface does not support configuration of the following **address** statement options: **arp**, **broadcast**, **primary**, **preferred**, and **vrrp-group**. For information about these options, see “Configuring the Interface Address” on page 182.

- Running IGMP and PIM are supported only on unnumbered Ethernet interfaces that directly face the host and have no downstream PIM neighbors. IGMP and PIM are not supported on unnumbered Ethernet interfaces that act as upstream interfaces in a PIM topology.
- Running OSPF and IS-IS on unnumbered Ethernet interfaces is not supported. However, you can run OSPF over unnumbered Ethernet interfaces configured as a Point-to-Point connection.

Example: Configuring an Unnumbered Ethernet Interface

In this example, **ge-1/0/0** is the unnumbered interface and **ge-0/0/0** is the donor interface from which **ge-1/0/0** “borrows” an IP address.

```
interfaces {
  ge-0/0/0 {
    unit 0 {
      family inet {
        address 4.4.4.1/24;
      }
    }
  }
  ge-1/0/0 {
    unit 0 {
      family inet {
        unnumbered-address ge-0/0/0.0;
      }
    }
  }
}
```

Example: Configuring the Preferred Source Address for an Unnumbered Ethernet Interface

In this example, loopback interface **lo0** is the donor interface from which unnumbered Ethernet interface **ge-4/0/0** “borrows” an IP address. The example also configures one of the loopback interface’s secondary addresses, 3.3.3.1, as the preferred source address for the unnumbered Ethernet interface.

```
interfaces {
  lo0 {
    unit 0 {
      family inet {
        address 2.2.2.1/32;
        address 3.3.3.1/32;
      }
    }
  }
}
interfaces {
  ge-4/0/0 {
    unit 0 {
      family inet {
        unnumbered-address lo0.0 preferred-source-address 3.3.3.1;
      }
    }
  }
}
```



```

    }
  }
}

```

Example: Configuring an Unnumbered Ethernet Interface as the Next Hop for a Static Route

In this example, **ge-0/0/0** is the unnumbered interface and a loopback interface, **lo0**, is the donor interface from which **ge-0/0/0** “borrows” an IP address. The example also configures a static route to **7.7.7.1/32** with a next hop through unnumbered interface **ge-0/0/0.0**.

```

interfaces {
  lo0 {
    unit 0 {
      family inet {
        address 5.5.5.1/32;
        address 6.6.6.1/32;
      }
    }
  }
}
interfaces
  ge-0/0/0 {
    unit 0 {
      family inet {
        unnumbered-address lo0.0;
      }
    }
  }
}
routing-options {
  static {
    route 7.7.7.1/32 {
      qualified next-hop ge-0/0/0.0;
    }
  }
}

```

Setting the Protocol MTU

When you initially configure an interface, the protocol maximum transmission unit (MTU) is calculated automatically. If you subsequently change the media MTU, the protocol MTU on existing address families automatically changes.

For a list of default protocol MTU values, see “Configuring the Media MTU” on page 106.

To modify the MTU for a particular protocol family, include the **mtu** statement:

mtu *bytes*;

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number* family *family*]**

- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

If you increase the size of the protocol MTU, you must ensure that the size of the media MTU is equal to or greater than the sum of the protocol MTU and the encapsulation overhead. For a list of encapsulation overhead values, see Table 20 on page 114. If you reduce the media MTU size, but there are already one or more address families configured and active on the interface, you must also reduce the protocol MTU size. (You configure the media MTU by including the **mtu** statement at the [edit interfaces *interface-name*] hierarchy level, as discussed in “Configuring the Media MTU” on page 106.)



NOTE: Changing the media MTU or protocol MTU causes an interface to be deleted and added again.

The maximum number of data-link connection identifiers (DLCIs) is determined by the MTU on the interface. If you have keepalives enabled, the maximum number of DLCIs is 1000, with the MTU set to 5012.

The actual frames transmitted also contain cyclic redundancy check (CRC) bits, which are not part of the MTU. For example, the default protocol MTU for a Gigabit Ethernet interface is 1500 bytes, but the largest possible frame size is actually 1504 bytes; you need to consider the extra bits in calculations of MTUs for interoperability.

Disabling the Removal of Address and Control Bytes

For Point-to-Point Protocol (PPP) CCC-encapsulated interfaces, the address and control bytes are removed by default before the packet is encapsulated into a tunnel.

You can disable the removal of address and control bytes. To do this, include the **keep-address-and-control** statement:

```
keep-address-and-control;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family *ccc*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *ccc*]

Disabling the Transmission of Redirect Messages on an Interface

By default, the interface sends protocol redirect messages. To disable the sending of these messages on an interface, include the **no-redirects** statement:

```
no-redirects;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family *family*]

- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

To disable the sending of protocol redirect messages for the entire router or switch, include the **no-redirects** statement at the [edit system] hierarchy level.

Configuring Default, Primary, and Preferred Addresses and Interfaces

The router has a default address and a primary interface, and interfaces have primary and preferred addresses.

The *default address* of the router is used as the source address on unnumbered interfaces. The routing protocol process tries to pick the default address as the router ID, which is used by protocols, including OSPF and internal BGP (IBGP).

The *primary interface* for the router is the interface that packets go out when no interface name is specified and when the destination address does not imply a particular outgoing interface.

An interface's *primary address* is used by default as the local address for broadcast and multicast packets sourced locally and sent out the interface. An interface's *preferred address* is the default local address used for packets sourced by the local router to destinations on the subnet.

The default address of the router is chosen using the following sequence:

1. The primary address on the loopback interface **lo0** that is not **127.0.0.1** is used.
2. The primary address on the primary interface is used.

To configure these addresses and interfaces, you can do the following:

- Configuring the Primary Interface for the Router on page 197
- Configuring the Primary Address for an Interface on page 198
- Configuring the Preferred Address for an Interface on page 198

Configuring the Primary Interface for the Router

The *primary interface* for the router has the following characteristics:

- It is the interface that packets go out when you type a command such as ping 255.255.255.255—that is, a command that does not include an interface name (there is no interface **type-0/0/0.0** qualifier) and where the destination address does not imply any particular outgoing interface.
- It is the interface on which multicast applications running locally on the router, such as Session Announcement Protocol (SAP), do group joins by default.
- It is the interface from which the default local address is derived for packets sourced out an unnumbered interface if there are no non-127 addresses configured on the loopback interface, lo0.

By default, the multicast-capable interface with the lowest-index address is chosen as the primary interface. If there is no such interface, the point-to-point interface with the lowest index address is chosen. Otherwise, any interface with an address could be picked. In practice, this means that, on the router, the **fxp0** or **em0** interface is picked by default.

To configure a different interface to be the primary interface, include the **primary** statement:

primary;

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family *family*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

Configuring the Primary Address for an Interface

The *primary address* on an interface is the address that is used by default as the local address for broadcast and multicast packets sourced locally and sent out the interface. For example, the local address in the packets sent by a **ping interface so-0/0/0.0 255.255.255.255** command is the primary address on interface **so-0/0/0.0**. The primary address flag also can be useful for selecting the local address used for packets sent out unnumbered interfaces when multiple non-127 addresses are configured on the loopback interface, **lo0**. By default, the primary address on an interface is selected as the numerically lowest local address configured on the interface.

To set a different primary address, include the **primary** statement:

primary;

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family *family* address *address*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family* address *address*]

Configuring the Preferred Address for an Interface

The *preferred address* on an interface is the default local address used for packets sourced by the local router to destinations on the subnet. By default, the numerically lowest local address is chosen. For example, if the addresses **172.16.1.1/12**, **172.16.1.2/12**, and **172.16.1.3/12** are configured on the same interface, the preferred address on the subnet (by default, **172.16.1.1**) would be used as a local address when you issue a **ping 172.16.1.5** command.

To set a different preferred address for the subnet, include the **preferred** statement:

preferred;

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family *family* address *address*]

- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family* address *address*]

Applying Policers

Policers allow you to perform simple traffic policing on specific interfaces or Layer 2 virtual private networks (VPNs) without configuring a firewall filter. To apply policers, include the **policer** statement:

```
policer {
  arp policer-template-name;
  input policer-template-name;
  output policer-template-name;
}
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family *family*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

In the **family** statement, the protocol family can be **ccc**, **inet**, **inet6**, **mpls**, **tcc**, or **vpls**.

In the **arp** statement, list the name of one policer template to be evaluated when Address Resolution Protocol (ARP) packets are received on the interface. By default, an ARP policer is installed that is shared among all the Ethernet interfaces on which you have configured the **family inet** statement. If you want more stringent or lenient policing of ARP packets, you can configure an interface-specific policer and apply it to the interface. You configure an ARP policer just as you would configure any other policer, at the [edit firewall policer] hierarchy level. If you apply this policer to an interface, the default ARP packet policer is overridden. If you delete this policer, the default policer takes effect again.

In the **input** statement, list the name of one policer template to be evaluated when packets are received on the interface.

In the **output** statement, list the name of one policer template to be evaluated when packets are transmitted on the interface.



NOTE: To use policing on a CCC or TCC interface, you must configure the CCC or TCC protocol family.

You can configure a different policer on each protocol family on an interface, with one input policer and one output policer for each family. When you apply policers, you can configure the family **ccc**, **inet**, **inet6**, **mpls**, **tcc**, or **vpls** only, and one ARP policer for the family **inet** protocol only. Each time a policer is referenced, a separate copy of the policer is installed on the packet forwarding components for that interface.

If you apply both policers and firewall filters to an interface, input policers are evaluated before input firewall filters, and output policers are evaluated after output firewall filters.

If you apply the policer to the interface **lo0**, it is applied to packets received or transmitted by the Routing Engine.

On T Series, M120, and M320 platforms, if the interfaces are on the same FPC, the filters or policers do not act on the sum of traffic entering and exiting the interfaces.

For more information about policers, see the [Junos OS Routing Policy Configuration Guide](#).

This section includes the following topics:

- Applying Aggregate Policers on page 200
- Applying Hierarchical Policers on Enhanced Intelligent Queuing PICs on page 202

Applying Aggregate Policers

By default, if you apply a policer to multiple protocol families on the same logical interface, the policer restricts traffic for each protocol family individually. For example, a policer with a 50 Mbps bandwidth limit applied to both IPv4 and IPv6 traffic would allow the interface to accept 50 Mbps of IPv4 traffic and 50 Mbps of IPv6 traffic. If you apply an aggregate policer, the policer would allow the interface to receive only 50 Mbps of IPv4 and IPv6 traffic combined.

To configure an aggregate policer, include the **logical-interface-policer** statement at the **[edit firewall policer *policer-template-name*]** hierarchy level:

```
[edit firewall policer policer-template-name]  
logical-interface-policer;
```

For the policer to be treated as an aggregate, you must apply it to multiple protocol families on a single logical interface by including the **policer** statement:

```
policer {  
  arp policer-template-name;  
  input policer-template-name;  
  output policer-template-name;  
}
```

You can include these statements at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number* family *family*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]**

In the **family** statement, the protocol family can be **ccc**, **inet**, **inet6**, **mpls**, **tcc**, or **vpls**.

The protocol families on which you do not apply the policer are not affected by the policer. For example, if you configure a single logical interface to accept MPLS, IPv4, and IPv6 traffic and you apply the logical interface policer **policer1** to only the IPv4 and IPv6 protocol families, MPLS traffic is not subject to the constraints of **policer1**.

If you apply **policer1** to a different logical interface, there are two instances of the policer. This means the Junos OS polices traffic on separate logical interfaces separately, not as an aggregate, even if the same logical-interface policer is applied to multiple logical interfaces on the same physical interface port.



NOTE: Logical interface policers are not supported for filter policers. In other words, you cannot include the **logical-interface-policer** statement at the [edit firewall filter *name* term *name* then policer] hierarchy level.

Example: Applying Aggregate Policers

Configure two logical interface policers: **aggregate_police1** and **aggregate_police2**. Apply **aggregate_police1** to IPv4 and IPv6 traffic received on logical interface **fe-0/0/0.0**. Apply **aggregate_police2** to CCC and MPLS traffic received on logical interface **fe-0/0/0.0**. This configuration causes the software to create only one instance of **aggregate_police1** and one instance of **aggregate_police2**.

Apply **aggregate_police1** to IPv4 and IPv6 traffic received on another logical interface **fe-0/0/0.1**. This configuration causes the software to create a new instance of **aggregate_police1**, one that applies to unit 0 and another that applies to unit 1.

```
[edit firewall]
policer aggregate_police1 {
  logical-interface-policer;
  if-exceeding {
    bandwidth-limit 100m;
    burst-size-limit 500k;
  }
  then {
    discard;
  }
}
policer aggregate_police2 {
  logical-interface-policer;
  if-exceeding {
    bandwidth-limit 10m;
    burst-size-limit 200k;
  }
  then {
    discard;
  }
}
[edit interfaces fe-0/0/0]
unit 0 {
  family inet {
    policer {
      input aggregate_police1;
    }
  }
  family inet6 {
    policer {
      input aggregate_police1;
    }
  }
}
```

```
    }  
  }  
  family ccc {  
    policer {  
      input aggregate_police2;  
    }  
  }  
  family mpls {  
    policer {  
      input aggregate_police2;  
    }  
  }  
}  
unit 1 {  
  family inet {  
    policer {  
      input aggregate_police1;  
    }  
  }  
  family inet6 {  
    policer {  
      input aggregate_police1;  
    }  
  }  
}
```

Applying Hierarchical Policers on Enhanced Intelligent Queuing PICs

M40e, M120, and M320 edge routers and T Series core routers with Enhanced Intelligent Queuing (IQE) PICs support hierarchical policers in the ingress direction and allow you to apply a hierarchical policer for the premium and aggregate (premium plus normal) traffic levels to an interface. Hierarchical policers provide cross-functionality between the configured physical interface and the Packet Forwarding Engine.

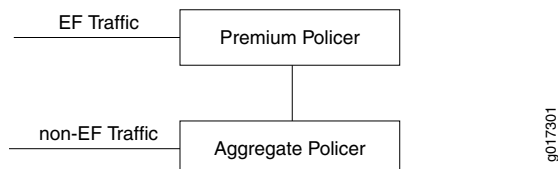
Before you begin, there are some general restrictions that apply to hierarchical policers:

- Only one type of policer can be configured for a logical or physical interface. For example, a hierarchical policer and a regular policer in the same direction for the same logical interface is not allowed.
- The chaining of the policers—that is, applying policers to both a port and the logical interfaces of that port—is not allowed.
- There is a limit of 64 policers per interface in case there is no BA classification, providing a single policer per DLCI.
- Only one kind of policer can be applied on a physical or logical interface.
- The policer should be independent of BA classification. Without BA classification, all traffic on an interface will be treated either as EF or non-EF, based on the configuration. With BA classification, an interface can support up to 64 policers. Again, the interface here may be a physical interface or logical interface (for example, DLCI).
- With BA classification, the miscellaneous traffic (the traffic *not* matching with any of the BA classification DSCP/EXP bits) will be policed as non-EF traffic. No separate policers will be installed for this traffic.

Hierarchical Policer Overview

Hierarchical policing uses two token buckets, one for aggregate (non-EF) traffic and one for premium (EF) traffic. Which traffic is EF and which is non-EF is determined by the class-of-service configuration. Logically, hierarchical policing is achieved by chaining two policers.

Figure 7: Hierarchical Policer



In the example in Figure 7 on page 203, EF traffic is policed by Premium Policer and non EF traffic is policed by Aggregate Policer. What that means is, for EF traffic the out-of-spec action will be the one that is configured for Premium Policer, but the in-spec EF traffic will still consume the tokens from the Aggregate Policer.

But EF traffic will never be submitted to the out-of-spec action of the Aggregate Policer. Also, if the out-of-spec action of the Premium Policer is not set to Discard, those out-of-spec packets will not consume the tokens from the Aggregate Policer. Aggregate Policer only polices the non-EF traffic. As you can see, the Aggregate Policer token bucket can go negative, if all the tokens are consumed by the non-EF traffic and then you get bursts of EF traffic. But that will be for a very short time, and over a period of time it will average out. For example:

- *Premium Policer*: Bandwidth 2 Mbps, OOS Action: Discard
- *Aggregate Policer*: Bandwidth 10 Mbps, OOS Action: Discard

In the above case, EF traffic is guaranteed 2 Mbps and the non-EF traffic will get from 8 Mbps to 10 Mbps, depending on the input rate of the EF traffic.

Hierarchical Policing Characteristics

Hierarchical token bucket features include:

- Ingress traffic is first classified into EF and non-EF traffic prior to applying a policer:
 - Classification is performed by Q-tree lookup
- Channel number selects a shared token bucket policer:
 - Dual token bucket policer is divided into two single bucket policers:
 - Policer1—EF traffic
 - Policer2—non-EF traffic
- Shared token bucket is used to police the traffic as follows:
 - Policer1 is set to EF rate (for example, 2 Mbps)
 - Policer2 is set to aggregate interface policed rate (for example, 10 Mbps).

- EF traffic gets applied to Policer1.
 - If traffic is in-spec it is allowed to pass and decrement from both Policer1 and Policer2.
 - If traffic is out-of-spec it can be discarded or marked with a new FC or loss priority. Policer2 will not do anything with out-of-spec EF traffic.
- Non-EF traffic gets applied only to Policer2.
 - If traffic is in-spec it is allowed to pass through and decremented Policer2.
 - If traffic is out-of-spec it is discarded or marked with a new FC or set with a new drop priority.
- Rate-limit the port speed to a desired rate at Layer 2
- Rate-limit the EF traffic
- Rate-limit the non-EF traffic
- Policing drops counted per color

Configuring Hierarchical Policers

To configure a hierarchical policer, apply the **policing-priority** statement to the proper forwarding class and configure a hierarchical policer for the aggregate and premium level. For more information about class of service, see the [Junos OS Class of Service Configuration Guide](#).



NOTE: Hierarchical policers can only be configured on SONET physical interfaces hosted on an IQE PIC. Only aggregate and premium levels are supported.

CoS Configuration of Forwarding Classes for Hierarchical Policers

```
[edit class-of-service forwarding-classes]
class fc1 queue-num 0 priority high policing-priority premium;
class fc2 queue-num 1 priority low policing-priority normal;
class fc3 queue-num 2 priority low policing-priority normal;
class fc4 queue-num 3 priority low policing-priority normal;
```

For detailed information on class-of-service configuration and statements, see the [Junos OS Class of Service Configuration Guide](#).

Firewall Configuration for Hierarchical Policers

```
[edit firewall hierarchical-policer foo]
aggregate {
  if-exceeding {
    bandwidth-limit 70m;
    burst-size-limit 1500;
  }
  then {
    discard;
  }
}
premium {
  if-exceeding {
    bandwidth-limit 50m;
```

```
        burst-size-limit 1500;
    }
    then {
        discard;
    }
}
```

You can apply the hierarchical policer as follows:

```
[edit interfaces so-0/1/0 unit 0 layer-2-policer]
input-hierarchical-policer foo;
```

You also have the option to apply the policer at the physical port level as follows:

```
[edit interfaces so-0/1/0 layer-2-policer]
input-hierarchical-policer foo;
```

Configuring a Single-Rate Two-Color Policer

You can configure a single-rate two-color policer as follows:

```
[edit firewall policer foo]
  if-exceeding {
    bandwidth-limit 50m;
    burst-size-limit 1500;
  }
  then {
    discard;
  }
}
```

You can apply the policer as follows:

```
[edit interfaces so-0/1/0 unit 0 layer-2-policer]
input-policer foo;
```

You also have the option to apply the policer at the physical port level as follows:

```
[edit interfaces so-0/1/0 layer-2-policer]
input-policer foo;
```

Configuring a Single-Rate Tricolor Policer

This section describes single-rate color blind and color aware policers.

Configuring a Single-Rate Color-Blind Policer

You can configure a single-rate color blind policer as follows:

```
[edit firewall three-color-policer foo]
single-rate {
  color-blind;
  committed-information-rate 50m;
  committed-burst-size 1500;
  excess-burst-size 1500;
}
```

You can apply the single-rate color blind policer as follows:

```
[edit interfaces so-0/1/0 unit 0 layer-2-policer]
input-three-color foo;
```

You also have the option to apply the policer at the physical port level as follows:

```
[edit interfaces so-0/1/0 layer-2-policer]
input-three-color foo;
```

Configuring a Single-Rate Color-Aware Policer

You can configure a single-rate color-aware policer as follows:

```
[edit firewall three-color-policer bar]
single-rate {
  color-aware;
  committed-information-rate 50m;
  committed-burst-size 1500;
  excess-burst-size 1500;
}
```

You can apply the single-rate color-aware policer as follows:

```
[edit interfaces so-0/1/0 unit 0 layer-2-policer]
input-three-color foo;
```

You also have the option to apply the policer at the physical port level as follows:

```
[edit interfaces so-0/1/0 layer-2-policer]
input-three-color bar;
```

Configuring a Two-Rate Tricolor Marker Policer

Ingress policing is implemented using a two-rate tricolor marker (trTCM). This is done with a dual token bucket (DTB) that maintains two rates, committed, and a peak. Egress static policing also uses a token bucket.

The token buckets perform the following ingress policing functions:

- (1K) trTCM - Dual token bucket (red, yellow, and green marking)
- Policing is based on Layer 2 packet size:
 - After +/- byte adjust offset
- Marking is color aware and color blind:
 - Color aware needs to have the color set by q-tree lookup based on:
 - ToS
 - EXP
- Programmable marking actions:
 - Color (red, yellow, green)
 - Drop based on color and congestion profile
- Policer is selected based on the arriving channel number:
 - Channel number LUT produces policer index and queue index
 - Multiple channels can share the same policer (LUT produces same policer index)

- Support ingress policing and trTCM at the following levels:
 - Queue
 - Logical interface (ifl/DLCI)
 - Physical interface (ifd)
 - Physical port (controller ifd)
 - Any combinations of logical interface, physical interface, and port
- Support percentage of interface speed and bits per second

Rate limits may be applied to selected queues on ingress and on predefined queues at egress. The token bucket operates in color aware and color blind modes (specified by RFC 2698).

Configuring a Color-Blind trTCM

```
[edit firewall three-color-policer foo]
two-rate {
  color-blind;
  committed-information-rate 50m;
  committed-burst-size 1500;
  peak-information-rate 100m;
  peak-burst-size 3k;
}
```

You can apply the three-color two-rate color-blind policer as follows:

```
[edit interfaces so-0/1/0 unit 0 layer-2-policer]
input-three-color foo;
```

You also have the option to apply the policer at the physical port level as follows:

```
[edit interfaces so-0/1/0 layer-2-policer]
input-three-color foo;
```

Configuring a Color-Aware trTCM

```
[edit firewall three-color-policer bar]
two-rate {
  color-aware;
  committed-information-rate 50m;
  committed-burst-size 1500;
  peak-information-rate 100m;
  peak-burst-size 3k;
}
```

You can apply the three-color two-rate color-aware policer as follows:

```
[edit interfaces so-0/1/0 unit 0 layer-2-policer]
input-three-color bar;
```

You also have the option to apply the policer at the physical port level as follows:

```
[edit interfaces so-0/1/0 layer-2-policer]
input-three-color bar;
```

Applying a Filter to an Interface

To apply firewall filters to an interface, include the **filter** statement:

```
filter {  
  group filter-group-number;  
  input filter-name;  
  input-list [ filter-names ];  
  output filter-name;  
  output-list [ filter-names ];  
}
```

To apply a single filter, include the **input** statement:

```
filter {  
  input filter-name;  
}
```

To apply a list of filters to evaluate packets received on an interface, include the **input-list** statement.

```
filter {  
  input-list [ filter-names ];  
}
```

Up to 16 filter names can be included in an input list.

To apply a list of filters to evaluate packets transmitted on an interface, include the **output-list** statement.

```
filter {  
  output-list [ filter-names ];  
}
```

When you apply filters using the **input-list** statement or the **output-list** statement, a new filter is created with the name *<interface-name>.<unit-direction>*. This filter is exclusively interface-specific.

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family *family*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

In the **family** statement, the protocol family can be **ccc**, **inet**, **inet6**, **mpls**, or **vpls**.

In the **group** statement, specify the interface group number to associate with the filter.

In the **input** statement, list the name of one firewall filter to be evaluated when packets are received on the interface.

In the **input-list** statement, list the names of filters to evaluate when packets are received on the interface. You can include up to 16 filter names.

In the **output** statement, list the name of one firewall filter to be evaluated when packets are transmitted on the interface.



NOTE: Output filters do not work for broadcast and multicast traffic, including VPLS traffic, as shown in “Example: Applying a Filter to an Interface” on page 210.



NOTE: On an MX Series router, you cannot apply as an output filter, a firewall filter configured at the [edit firewall filter family ccc] hierarchy level. Firewall filters configured for the family ccc statement can be applied only as input filters.

In the **output-list** statement, list the names of filters to evaluate when packets are transmitted on the interface. You can include up to 16 filter names.

You can use the same filter one or more times. On M Series routers (except the M320 and M120 routers), if you apply a firewall filter or policer to multiple interfaces, the filter or policer acts on the sum of traffic entering or exiting those interfaces.

On T Series, M120, and M320 routers, interfaces are distributed among multiple packet forwarding components. Therefore, on these routers, if you apply a firewall filter or policer to multiple interfaces, the filter or policer acts on the traffic stream entering or exiting each interface, regardless of the sum of traffic on the multiple interfaces.

For more information on Understanding Ethernet Frame Statistics, see the *MX Series Layer 2 Configuration Guide*.

If you apply the filter to the interface **lo0**, it is applied to packets received or transmitted by the Routing Engine. You cannot apply MPLS filters to the management interface (**fxp0** or **em0**) or the loopback interface (**lo0**).

For more information about firewall filters, see the *Junos OS Routing Policy Configuration Guide*. For more information about MPLS filters, see the *Junos OS MPLS Applications Configuration Guide*.

See also the following sections:

- Defining Interface Groups in Firewall Filters on page 209
- Filter-Based Forwarding on the Output Interface on page 210
- Example: Applying a Filter to an Interface on page 210

Defining Interface Groups in Firewall Filters

When applying a firewall filter, you can define an interface to be part of an *interface group*. Packets received on that interface are tagged as being part of the group. You can then match these packets using the **interface-group** match statement, as described in the *Junos OS Routing Policy Configuration Guide*.

To define the interface to be part of an interface group, include the **group** statement:

```
group filter-group-number;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family *family* filter]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family* filter]



NOTE: The number 0 is not a valid interface group number.

Filter-Based Forwarding on the Output Interface

If port-mirrored packets are to be distributed to multiple monitoring or collection interfaces, based on patterns in packet headers, it is helpful to configure a filter-based forwarding (FBF) filter on the port-mirroring egress interface.

When an FBF filter is installed as an output filter, a packet that is forwarded to the filter has already undergone at least one route lookup. After the packet is classified at the egress interface by the FBF filter, it is redirected to another routing table for additional route lookup. To avoid packet looping inside the Packet Forwarding Engine, the route lookup in the latter routing table (designated by an FBF routing instance) must result in a different next hop from any next hop specified in a table that has already been applied to the packet.

If an input interface is configured for FBF, the source lookup is disabled for those packets headings to a different routing instance, since the routing table is not set up to handle the source lookup.

For more information about FBF configuration, see the [Junos OS Routing Protocols Configuration Guide](#). For more information about port mirroring, see the [Junos OS Services Interfaces Configuration Guide](#).

Example: Applying a Filter to an Interface

Input Filter for VPLS Traffic

For M Series and T Series routers only, apply an input filter to VPLS traffic. Output filters do not work for broadcast and multicast traffic, including VPLS traffic.

```
[edit interfaces]
fe-2/2/3 {
  vlan-tagging;
  encapsulation vlan-vpls;
  unit 601 {
    encapsulation vlan-vpls;
    vlan-id 601;
    family vpls {
      filter {
        input filter1; # Works for multicast destination MAC address
        output filter1; # Does not work for multicast destination MAC address
      }
    }
  }
}
```



```

    }
  }
[edit firewall]
family vpls {
  filter filter1 {
    term 1 {
      from {
        destination-mac-address {
          01:00:0c:cc:cc:cd/48;
        }
      }
      then {
        discard;
      }
    }
    term 2 {
      then {
        accept;
      }
    }
  }
}
}

```

Filter-Based Forwarding at the Output Interface

The following example illustrates the configuration of filter-based forwarding at the output interface. In this example, the packet flow follows this path:

1. A packet arrives at interface **fe-1/2/0.0** with source and destination addresses **10.50.200.1** and **10.50.100.1** respectively.
2. The route lookup in routing table **inet.0** points to the egress interface **so-0/0/3.0**.
3. The output filter installed at **so-0/0/3.0** redirects the packet to routing table **fbf.inet.0**.
4. The packet matches the entry **10.50.100.0/25** in the **fbf.inet.0** table, and finally leaves the router from interface **so-2/0/0.0**.

```

[edit interfaces]
so-0/0/3 {
  unit 0 {
    family inet {
      filter {
        output fbf;
      }
      address 10.50.10.2/25;
    }
  }
}
fe-1/2/0 {
  unit 0 {
    family inet {
      address 10.50.50.2/25;
    }
  }
}
so-2/0/0 {
  unit 0 {

```

```
        family inet {
            address 10.50.20.2/25;
        }
    }
}
[edit firewall]
filter fbf {
    term 0 {
        from {
            source-address {
                10.50.200.0/25;
            }
        }
        then routing-instance fbf;
    }
    term d {
        then count d;
    }
}
[edit routing-instances]
fbf {
    instance-type forwarding;
    routing-options {
        static {
            route 10.50.100.0/25 next-hop so-2/0/0.0;
        }
    }
}
[edit routing-options]
interface-routes {
    rib-group inet fbf-group;
}
static {
    route 10.50.100.0/25 next-hop 10.50.10.1;
}
rib-groups {
    fbf-group {
        import-rib [inet.0 fbf.inet.0];
    }
}
```

Configuring Unicast RPF

For interfaces that carry IPv4 or IPv6 traffic, you can reduce the impact of denial of service (DoS) attacks by configuring unicast reverse path forwarding (RPF). Unicast RPF helps determine the source of attacks and rejects packets from unexpected source addresses on interfaces where unicast RPF is enabled.



NOTE: If you want to configure unicast RPF, your router must be equipped with the Internet Processor II application-specific integrated circuit (ASIC).

If you enable unicast RPF on live traffic, some packets are dropped while the packet forwarding components are updating.

For transit packets exiting the router through the tunnel, forwarding path features, such as RPF, forwarding table filtering, source class usage, and destination class usage are not supported on the interfaces you configure as the output interface for tunnel traffic. For firewall filtering, you must allow the output tunnel packets through the firewall filter applied to input traffic on the interface that is the next-hop interface towards the tunnel destination.

The following sections describe unicast RPF in detail:

- Configuring Unicast RPF Strict Mode on page 213
- Configuring Unicast RPF Loose Mode on page 214
- Unicast RPF and Default Routes on page 214
- Unicast RPF with Routing Asymmetry on page 216
- Configuring Unicast RPF on a VPN on page 216
- Example: Configuring Unicast RPF on page 217

Configuring Unicast RPF Strict Mode

In strict mode, unicast RPF checks whether the incoming packet has a source address that matches a prefix in the routing table, and whether the interface expects to receive a packet with this source address prefix.

If the incoming packet fails the unicast RPF check, the packet is not accepted on the interface. When a packet is not accepted on an interface, unicast RPF counts the packet and sends it to an optional fail filter. If the fail filter is not configured, the default action is to silently discard the packet.

The optional fail filter allows you to apply a filter to packets that fail the unicast RPF check. You can define the fail filter to perform any filter operation, including accepting, rejecting, logging, sampling, or policing.

When unicast RPF is enabled on an interface, Bootstrap Protocol (BOOTP) packets and Dynamic Host Configuration Protocol (DHCP) packets are not accepted on the interface. To allow the interface to accept BOOTP packets and DHCP packets, you must apply a fail filter that accepts all packets with a source address of **0.0.0.0** and a destination address of **255.255.255.255**. For a configuration example, see “Example: Configuring Unicast RPF” on page 217.

For more information about unicast RPF, see the [Junos OS Routing Protocols Configuration Guide](#). For more information about defining fail filters, see the [Junos OS Routing Policy Configuration Guide](#).

To configure unicast RPF, include the **rpf-check** statement:

```
rpf-check <fail-filter filter-name>;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family (inet | inet6)]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family (inet | inet6)]

Using unicast RPF can have several consequences when implemented with traffic filters:

- RPF fail filters are evaluated after input filters and before output filters.
- If you configure a filter counter for packets dropped by an input filter, and you want to know the total number of packets dropped, you must also configure a filter counter for packets dropped by the RPF check.
- To count packets that fail the RPF check and are accepted by the RPF fail filter, you must configure a filter counter.
- If an input filter forwards packets anywhere other than the **inet.0** or **inet6.0** routing tables, the unicast RPF check is not performed.
- If an input filter forwards packets anywhere other than the routing instance the input interface is configured for, the unicast RPF check is not performed.

Configuring Unicast RPF Loose Mode

By default, unicast RPF uses strict mode. Unicast RPF loose mode is similar to unicast RPF strict mode and has the same configuration restrictions. The only check in loose mode is whether the packet has a source address with a corresponding prefix in the routing table; loose mode does not check whether the interface expects to receive a packet with a specific source address prefix. If a corresponding prefix is not found, unicast RPF loose mode does not accept the packet. As in strict mode, loose mode counts the failed packet and optionally forwards it to a fail filter, which either accepts, rejects, logs, samples, or polices the packet.

To configure unicast RPF loose mode, include the **mode**:

```
mode loose;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family (inet | inet6) rpf-check <fail-filter *filter-name*>]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family (inet | inet6) rpf-check <fail-filter *filter-name*>]

Unicast RPF and Default Routes

When the active route cannot be chosen from the routes in a routing table, the router chooses a default route. A default route is equivalent to an IP address of 0.0.0.0/0. If you configure a default route, and you configure unicast RPF on an interface that the

default route uses, unicast RPF behaves differently than it does otherwise. For information about configuring default routes, see the [Junos OS Routing Protocols Configuration Guide](#).

To determine whether the default route uses an interface, enter the **show route** command:

```
user@host> show route address
```

address is the next-hop address of the configured default route. The default route uses the interfaces shown in the output of the **show route** command.

The following sections describe how unicast RPF behaves when a default route uses an interface and when a default route does not use an interface:

- Unicast RPF Behavior with a Default Route on page 215
- Unicast RPF Behavior Without a Default Route on page 215

Unicast RPF Behavior with a Default Route

If you configure a default route that uses an interface configured with unicast RPF, unicast RPF behaves as follows:

- Loose mode—All packets are automatically accepted. For this reason, we recommend that you not configure unicast RPF loose mode on interfaces that the default route uses.
- Strict mode—The packet is accepted when either of the following is true:
 - The source address of the packet matches any of the routes (either default or learned) that can be originated from the interface. Note that routes can have multiple destinations associated with them; therefore, if one of the destinations matches the incoming interface of the packet, the packet is accepted.
 - The source address of the packet does not match any of the routes.

The packet is not accepted when either of the following is true:

- The source address of the packet does not match a prefix in the routing table.
- The interface does not expect to receive a packet with this source address prefix.

Unicast RPF Behavior Without a Default Route

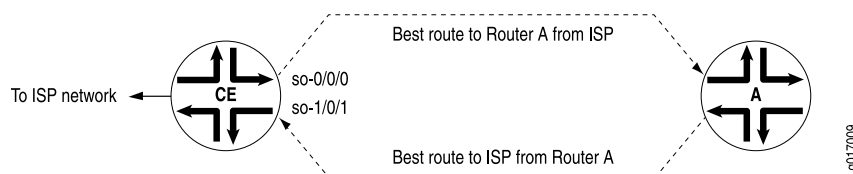
If you do not configure a default route, or if the default route does not use an interface configured with unicast RPF, unicast RPF behaves as described in “Configuring Unicast RPF Strict Mode” on page 213 and “Configuring Unicast RPF Loose Mode” on page 214. To summarize, unicast RPF without a default route behaves as follows:

- Strict mode—The packet is not accepted when either of the following is true:
 - The packet has a source address that does not match a prefix in the routing table.
 - The interface does not expect to receive a packet with this source address prefix.
- Loose mode—The packet is not accepted when the packet has a source address that does not match a prefix in the routing table.

Unicast RPF with Routing Asymmetry

In general, we recommend that you not enable unicast RPF on interfaces that are internal to the network because internal interfaces are likely to have *routing asymmetry*. Routing asymmetry means that a packet's outgoing and return paths are different. Routers in the core of the network are more likely to have asymmetric reverse paths than routers at the customer or provider edge. Figure 8 on page 216 shows unicast RPF in an environment with routing asymmetry.

Figure 8: Unicast RPF with Routing Asymmetry



In Figure 8 on page 216, if you enable unicast RPF on interface **so-0/0/0**, traffic destined for Router A is not rejected. If you enable unicast RPF on interface **so-1/0/1**, traffic from Router A is rejected.

If you need to enable unicast RPF in an asymmetric routing environment, you can use fail filters to allow the router to accept incoming packets that are known to be arriving by specific paths. For an example of a fail filter that accepts packets with a specific source and destination address, see “Example: Configuring Unicast RPF” on page 217.

Configuring Unicast RPF on a VPN

You can configure unicast RPF on a VPN interface by enabling unicast RPF on the interface and including the **interface** statement at the **[edit routing-instances routing-instance-name]** hierarchy level.

You can configure unicast RPF only on the interfaces you specify in the routing instance. This means the following:

- For Layer 3 VPNs, unicast RPF is supported on the CE router interface.
- Unicast RPF is not supported on core-facing interfaces.
- For virtual-router routing instances, unicast RPF is supported on all interfaces you specify in the routing instance.
- If an input filter forwards packets anywhere other than the routing instance the input interface is configured for, the unicast RPF check is not performed.

For more information about VPNs and virtual-router routing instances, see the [Junos OS VPNs Configuration Guide](#). For more information about FBF, see the [Junos OS Routing Protocols Configuration Guide](#).

Example: Configuring Unicast RPF on a VPN

Configure unicast RPF on a Layer 3 VPN interface:

```
[edit interfaces]
```

```

so-0/0/0 {
  unit 0 {
    family inet {
      rpf-check;
    }
  }
}
[edit routing-instance]
VPN-A {
  interface so-0/0/0.0;
}

```

Example: Configuring Unicast RPF

Configure unicast RPF strict mode, and apply a fail filter that allows the interface to accept BOOTP packets and DHCP packets. The filter accepts all packets with a source address of 0.0.0.0 and a destination address of 255.255.255.255.

```

[edit firewall]
filter rpf-special-case-dhcp-bootp {
  term allow-dhcp-bootp {
    from {
      source-address {
        0.0.0.0/32;
      }
      address {
        255.255.255.255/32;
      }
    }
    then {
      count rpf-dhcp-bootp-traffic;
      accept;
    }
  }
  term default {
    then {
      log;
      reject;
    }
  }
}
[edit]
interfaces {
  so-0/0/0 {
    unit 0 {
      family inet {
        rpf-check fail-filter rpf-special-case-dhcp-bootp;
      }
    }
  }
}

```

Enabling Source Class and Destination Class Usage

For interfaces that carry IPv4, IPv6, MPLS, or peer AS billing traffic, you can maintain packet counts based on the entry and exit points for traffic passing through your network. Entry and exit points are identified by source and destination prefixes grouped into disjoint sets defined as *source classes* and *destination classes*. You can define classes based on a variety of parameters, such as routing neighbors, autonomous systems, and route filters.

Source class usage (SCU) counts packets sent to customers by performing lookup on the IP source address. SCU makes it possible to track traffic originating from specific prefixes on the provider core and destined for specific prefixes on the customer edge. You must enable SCU accounting on both the inbound and outbound physical interfaces, and the route for the source of the packet must be in located in the forwarding table.



NOTE: SCU and DCU accounting do not work with directly connected interface routes. Source class usage does not count packets coming from sources with direct routes in the forwarding table because of software architecture limitations.

Destination class usage (DCU) counts packets from customers by performing lookup of the IP destination address. DCU makes it possible to track traffic originating from the customer edge and destined for specific prefixes on the provider core router.



NOTE: SCU and DCU accounting are supported on the J Series router only for IPv4 and IPv6 traffic.

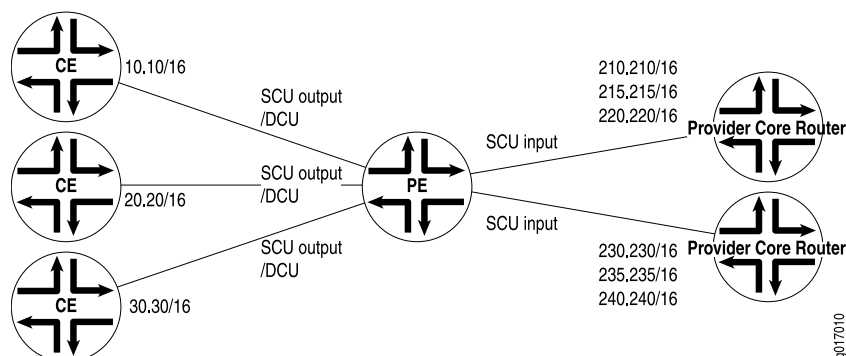


NOTE: We recommend that you stop the network traffic on an interface before you modify the DCU or SCU configuration for that interface. Modifying the DCU or SCU configuration without stopping the traffic might corrupt the DCU or SCU statistics. Before you restart the traffic after modifying the configuration, enter the `clear interfaces statistics` command.

Figure 9 on page 219 illustrates an Internet service provider (ISP) network. In this topology, you can use DCU to count packets customers send to specific prefixes. For example, you can have three counters, one per customer, that count the packets destined for prefix `210.210/16` and `220.220/16`.

You can use SCU to count packets the provider sends from specific prefixes. For example, you can count the packets sent from prefix `210.210/16` and `215.215/16` and transmitted on a specific output interface.

Figure 9: Prefix Accounting with Source and Destination Classes



You can configure up to 126 source classes and 126 destination classes. For each interface on which you enable destination class usage and source class usage, the Junos OS maintains an interface-specific counter for each corresponding class up to the 126 class limit.



NOTE: For transit packets exiting the router through the tunnel, forwarding path features, such as RPF, forwarding table filtering, source class usage, and destination class usage are not supported on the interfaces you configure as the output interface for tunnel traffic. For firewall filtering, you must allow the output tunnel packets through the firewall filter applied to input traffic on the interface that is the next-hop interface towards the tunnel destination.



NOTE:

Performing DCU accounting when an output service is enabled produces inconsistent behavior in the following configuration:

- Both SCU input and DCU are configured on the packet input interface.
- SCU output is configured on the packet output interface.
- Interface services is enabled on the output interface.

For an incoming packet with source and destination prefixes matching the SCU and DCU classes respectively configured in the router, both SCU and DCU counters will be incremented. This behavior is not harmful or negative. However, it is inconsistent with non-serviced packets, in that only the SCU count will be incremented (because the SCU class ID will override the DCU class ID in this case).

To enable packet counting on an interface, include the **accounting** statement:

```
accounting {
  destination-class-usage;
  source-class-usage {
    direction;
  }
}
```

```
}
```

direction can be one of the following:

- **input**—Configure at least one expected ingress point.
- **output**—Configure at least one expected egress point.
- **input output**—On a single interface, configure at least one expected ingress point and one expected egress point.

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family (inet | inet6 | mpls)]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family (inet | inet6 | mpls)]

For SCU to work, you must configure at least one input interface and at least one output interface. An incoming packet is counted only once, and SCU takes priority over DCU. This means that when a packet arrives on an interface on which you include the **source-class-usage input** and **destination-class-usage** statements in the configuration, and when the source and destination both match accounting prefixes, the Junos OS associates the packet with the source class only.



NOTE: On the Junos Trio chipset-based Packet Forwarding Engine (PFE), both SCU and DCU accounting will work for a single packet if both SCU and DCU are configured.

To ensure the outgoing packet is counted, include the **source-class-usage output** statements in the configuration of the outgoing interface.

On T Series, M120, and M320 routers, the source class and destination classes are not carried across the router fabric. The implications of this are as follows:

- On T Series, M120, and M320 routers, SCU and DCU accounting is performed before the packet enters the fabric.
- On T Series, M120, and M320 routers, DCU is performed before output filters are evaluated. On other M Series routers, DCU is performed after output filters are evaluated.
- If an output filter drops traffic on T Series, M120, and M320 routers, the dropped packets are included in DCU statistics. If an output filter drops traffic on other M Series routers, the dropped packets are excluded from DCU statistics.
- On T Series, M120, and M320 platforms, the **destination-class** and **source-class** statements are supported at the [edit firewall family *family-name* filter *filter-name* term *term-name* from] hierarchy level only for the filter applied to the forwarding table. On other M Series platforms, these statements are supported.

Once you enable accounting on an interface, the Junos OS maintains packet counters for that interface, with separate counters for **inet**, **inet6**, and **mpls** protocol families. You

must then configure the source class and destination class attributes in policy action statements, which must be included in forwarding-table export policies.

In Junos OS Release 9.3 and later, you can configure SCU accounting for Layer 3 VPNs configured with the **vrf-table-label** statement. Include the **source-class-usage** statement at the **[edit routing-instances routing-instance-name vrf-table-label]** hierarchy level. The **source-class-usage** statement at this hierarchy level is supported only for the virtual routing and forwarding (VRF) instance type. DCU is not supported when the **vrf-table-label** statement is configured. For more information, see the [Junos OS VPNs Configuration Guide](#).

For a complete discussion about source and destination class accounting profiles, see the [Junos OS Network Management Configuration Guide](#). For more information about MPLS, see the [Junos OS MPLS Applications Configuration Guide](#).

Examples: Enabling Source Class and Destination Class Usage

Configure DCU and SCU output on one interface:

```
[edit]
interfaces {
  so-6/1/0 {
    unit 0 {
      family inet {
        accounting {
          destination-class-usage;
          source-class-usage {
            output;
          }
        }
      }
    }
  }
}
```

Complete SCU Configuration

Source routers A and B use loopback addresses as the prefixes to be monitored. Most of the configuration tasks and actual monitoring occur on transit Router SCU.

The loopback address on Router A contains the origin of the prefix that is to be assigned to source class A on Router SCU. However, no SCU processing happens on this router. Therefore, configure Router A for basic OSPF routing and include your loopback interface and interface **so-0/0/2** in the OSPF process.

Router A

```
[edit]
interfaces {
  so-0/0/2 {
    unit 0 {
      family inet {
        address 10.255.50.2/24;
      }
    }
  }
  lo0 {
    unit 0 {
      family inet {
        address 10.255.192.10/32;
      }
    }
  }
}
```

```
    }  
  }  
}  
protocols {  
  ospf {  
    area 0.0.0.0 {  
      interface so-0/0/2.0;  
      interface lo0.0;  
    }  
  }  
}
```

Router SCU Last, apply the policy to the forwarding table.

Router SCU handles the bulk of the activity in this example. On Router SCU, enable source class usage on the inbound and outbound interfaces at the **[edit interfaces interface-name unit unit-number family inet accounting]** hierarchy level. Make sure you specify the expected traffic: input, output, or, in this case, both.

Next, configure a route filter policy statement that matches the prefixes of the loopback addresses from routers A and B. Include statements in the policy that classify packets from Router A in one group named **scu-class-a** and packets from Router B in a second class named **scu-class-b**. Notice the efficient use of a single policy containing multiple terms.

```
[edit]  
interfaces {  
  so-0/0/1 {  
    unit 0 {  
      family inet {  
        accounting {  
          source-class-usage {  
            input;  
            output;  
          }  
        }  
        address 10.255.50.1/24;  
      }  
    }  
  }  
  so-0/0/3 {  
    unit 0 {  
      family inet {  
        accounting {  
          source-class-usage {  
            input;  
            output;  
          }  
        }  
        address 10.255.10.3/24;  
      }  
    }  
  }  
  lo0 {  
    unit 0 {
```

```

        family inet {
            address 10.255.6.111/32;
        }
    }
}
protocols {
    ospf {
        area 0.0.0.0 {
            interface so-0/0/1.0;
            interface so-0/0/3.0;
        }
    }
}
routing-options {
    forwarding-table {
        export scu-policy;
    }
}
policy-options {
    policy-statement scu-policy {
        term 0 {
            from {
                route-filter 10.255.192.0/24 orlonger;
            }
            then source-class scu-class-a;
        }
        term 1 {
            from {
                route-filter 10.255.165.0/24 orlonger;
            }
            then source-class scu-class-b;
        }
    }
}
}

```

Router B Just as Router A provides a source prefix, Router B's loopback address matches the prefix assigned to **scu-class-b** on Router SCU. Again, no SCU processing happens on this router, so configure Router B for basic OSPF routing and include your loopback interface and interface **so-0/0/4** in the OSPF process.

```

interfaces {
    so-0/0/4 {
        unit 0 {
            family inet {
                address 10.255.10.4/24;
            }
        }
    }
    lo0 {
        unit 0 {
            family inet {
                address 10.255.165.226/32;
            }
        }
    }
}

```

```
}
protocols {
  ospf {
    area 0.0.0.0 {
      interface so-0/0/4.0;
      interface lo0.0;
    }
  }
}
```

Enabling Packet Counting for Layer 3 VPNs

You can use SCU and DCU to count packets on Layer 3 VPNs. To enable packet counting for Layer 3 VPN implementations at the egress point of the MPLS tunnel, you must configure a virtual loopback tunnel interface (**vt**) on the PE router, map the virtual routing and forwarding (VRF) instance type to the virtual loopback tunnel interface, and send the traffic received from the VPN out the source class output interface, as shown in the following example:

Configure a virtual loopback tunnel interface on a provider edge router equipped with a tunnel PIC:

```
[edit interfaces]
vt-0/3/0 {
  unit 0 {
    family inet {
      accounting {
        source-class-usage {
          input;
        }
      }
    }
  }
}
```

Map the VRF instance type to the virtual loopback tunnel interface.

In Junos OS Release 9.3 and later, you can configure SCU accounting for Layer 3 VPNs configured with the **vrf-table-label** statement. Include the **source-class-usage** statement at the **[edit routing-instances routing-instance-name vrf-table-label]** hierarchy level. The **source-class-usage** statement at this hierarchy level is supported only for the virtual routing and forwarding (VRF) instance type. DCU is not supported when the **vrf-table-label** statement is configured. For more information, see the [Junos OS VPNs Configuration Guide](#).

```
[edit routing-instances]
VPN-A {
  instance-type vrf;
  interface at-2/1/1.0;
  interface vt-0/3/0.0;
  route-distinguisher 10.255.14.225:100;
  vrf-import import-policy-A;
  vrf-export export-policy-A;
  protocols {
    bgp {
      group to-r4 {
        local-address 10.27.253.1;
        peer-as 400;
        neighbor 10.27.253.2;
      }
    }
  }
}
```

```

    }
  }
}

```

Send traffic received from the VPN out the source class output interface:

```

[edit interfaces]
at-2/1/0 {
  unit 0 {
    family inet {
      accounting {
        source-class-usage {
          output;
        }
      }
    }
  }
}

```

For more information about VPNs, see the [Junos OS VPNs Configuration Guide](#). For more information about virtual loopback tunnel interfaces, see the [Junos OS Services Interfaces Configuration Guide](#).

Related Documentation

- [accounting on page 296](#)
- [destination-classes](#)
- [family on page 441](#)
- [forward-and-send-to-re on page 451](#)
- [source-classes](#)
- [targeted-broadcast on page 741](#)
- [unit on page 770](#)

Enabling Targeted Broadcast

- [Understanding Targeted Broadcast on page 226](#)
- [Configuring Targeted Broadcast on page 227](#)
- [Example: Configuring Targeted Broadcast on page 228](#)

Understanding Targeted Broadcast

Targeted broadcast is a process of flooding a target subnet with Layer 3 broadcast IP packets originating from a different subnet. The intent of targeted broadcast is to flood the target subnet with the broadcast packets on a LAN interface without broadcasting to the entire network. Targeted broadcast is configured with various options on the egress interface of the router and the IP packets are broadcast only on the LAN (egress) interface. Targeted broadcast helps you implement remote administration tasks such as backups and wake-on LAN (WOL) on a LAN interface, and supports virtual routing and forwarding (VRF) instances.

Regular Layer 3 broadcast IP packets originating from a subnet are broadcast within the same subnet. When these IP packets reach a different subnet, they are forwarded to the Routing Engine (to be forwarded to other applications). Because of this, remote administration tasks such as backups cannot be performed on a particular subnet through another subnet. As a workaround you can enable targeted broadcast, to forward broadcast packets that originate from a different subnet.

Layer 3 broadcast IP packets have a destination IP address that is a valid broadcast address for the target subnet. These IP packets traverse the network in the same way as unicast IP packets until they reach the destination subnet. In the destination subnet, if the receiving router has targeted broadcast enabled on the egress interface, the IP packets are forwarded to an egress interface and the Routing Engine or to an egress interface only. The IP packets are then translated into broadcast IP packets which flood the target subnet only through the LAN interface (if there is no LAN interface, the packets are discarded), and all hosts on the target subnet receive the IP packets. If targeted broadcast is not enabled on the receiving router, the IP packets are treated as regular Layer 3 broadcast IP packets and are forwarded to the Routing Engine. If targeted broadcast is enabled without any options, the IP packets are discarded.

Targeted broadcast can be configured to forward the IP packets only to an egress interface, which is helpful when the router is flooded with packets to process, or to both an egress interface and the Routing Engine.



NOTE: Any firewall filter that is configured on the Routing Engine loopback interface (lo0) cannot be applied to IP packets that are forwarded to the Routing Engine as a result of a targeted broadcast. This is because broadcast packets are forwarded as flood next hop and not as local next hop traffic, and you can only apply a firewall filter to local next hop routes for traffic directed towards the Routing Engine.

Related Documentation

- [Configuring Targeted Broadcast on page 227](#)
- [Example: Configuring Targeted Broadcast on page 228](#)
- [targeted-broadcast on page 741](#)

Configuring Targeted Broadcast

You can configure targeted broadcast with different options to forward the IP packets destined for a Layer 3 broadcast address to an egress interface and the Routing Engine or to an egress interface only. The packets are broadcast only if the egress interface is a LAN interface.

To enable targeted broadcast:

1. Configure the physical interface:

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

2. Configure the logical unit number:

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

3. Configure the protocol family `inet`:

```
[edit interfaces interface-name unit logical-unit-number]
user@host# edit family inet
```

4. Configure targeted broadcast:

```
[edit interfaces interface-name unit logical-unit-number family inet]
user@host# edit targeted-broadcast
```

5. Specify one of the following options:

- To send packets to the egress interface and to the Routing Engine:

```
[edit interfaces interface-name unit logical-unit-number family inet
targeted-broadcast]
user@host# set forward-and-send-to-re
```

- To send packets to only the egress interface:

```
[edit interfaces interface-name unit logical-unit-number family inet
targeted-broadcast]
user@host# set forward-only
```

6. Verify the configuration. The following example configures targeted broadcast to both the egress interface and the Routing Engine:

```
[edit interfaces interface-name unit logical-unit-number family inet targeted-broadcast]
user@host# up
user@host# show
targeted-broadcast {
  forward-and-send-to-re;
}
}
```

Related Documentation

- Example: Configuring Targeted Broadcast on page 228
- `targeted-broadcast` on page 741
- Understanding Targeted Broadcast on page 226

Example: Configuring Targeted Broadcast

Using the **targeted-broadcast** statement, you can configure the options to forward broadcast IP packets either to both an egress interface and the Routing Engine, or to an egress interface only.

- [Example: Configuring Targeted Broadcast to the Egress Interface and to the Routing Engine on page 228](#)
- [Example: Configuring Targeted Broadcast to Only the Egress Interface on page 228](#)

Example: Configuring Targeted Broadcast to the Egress Interface and to the Routing Engine

Configure targeted broadcast to the egress interface and to the Routing Engine:

```
[edit]
interfaces {
  ge-2/0/0 {
    unit 0 {
      family inet {
        address 10.20.20.1/24;
        address 192.168.103.9/30;
        address 10.17.214.12/26;
        targeted-broadcast {
          forward-and-send-to-re;
        }
      }
    }
  }
}
```

Example: Configuring Targeted Broadcast to Only the Egress Interface

Configure targeted broadcast to the egress interface:

```
[edit]
interfaces {
  ge-2/0/0 {
    unit 0 {
      family inet {
        address 10.10.10.2/24;
        targeted-broadcast {
          forward-only;
        }
      }
    }
  }
}
```

Related Documentation

- [Configuring Targeted Broadcast on page 227](#)
- [targeted-broadcast on page 741](#)
- [Understanding Targeted Broadcast on page 226](#)

CHAPTER 6

Configuring Circuit and Translational Cross-Connects

- Circuit and Translational Cross-Connects Overview on page 229
- Defining the Encapsulation for Switching Cross-Connects on page 231
- Defining the Connection for Switching Cross-Connects on page 234
- Configuring MPLS for Switching Cross-Connects on page 235
- Configuring IS-IS or MPLS Traffic for TCC Interfaces on page 235
- Configuring ATM-to-Ethernet Interworking on page 236
- Examples: Configuring Switching Cross-Connects on page 239

Circuit and Translational Cross-Connects Overview

Circuit cross-connect (CCC) and translational cross-connect (TCC) allow you to configure transparent connections between two circuits, where a circuit can be a Frame Relay data-link connection identifier (DLCI), an Asynchronous Transfer Mode (ATM) virtual circuit (VC), a Point-to-Point Protocol (PPP) interface, a Cisco High-level Data Link Control (HDLC) interface, or a Multiprotocol Label Switching (MPLS) label-switched path (LSP).

Using CCC or TCC, packets from the source circuit are delivered to the destination circuit with, at most, the Layer 2 address being changed. No other processing, such as header checksums, time-to-live (TTL) decrementing, or protocol processing, is done.

To connect interfaces of the same type, use CCC. To connect unlike interfaces, use TCC.

CCC and TCC circuits fall into three categories: logical interfaces, which include ATM VCs and Frame Relay DLCIs; physical interfaces, which include PPP and Cisco HDLC; and paths, which include LSPs. The three circuit categories provide three types of cross-connect:

- Layer 2 switching (interface-to-interface)—Cross-connects between logical interfaces provide what is essentially Layer 2 switching.
- MPLS tunneling (interface-to-LSP)—Cross-connects between interfaces and LSPs allow you to connect two distant interface circuits by creating MPLS tunnels that use LSPs as the conduit.

- LSP stitching (LSP-to-LSP)—Cross-connects between LSPs provide a way to “stitch” together two label-switched paths, including paths that fall in two different traffic engineering database (TED) areas.

The cross-connect is bidirectional, so packets received on the first interface are transmitted out the second interface, and those received on the second interface are transmitted out the first interface.

For most CCC connections that connect interfaces, the interfaces must be of the same type; that is, ATM to ATM, Frame Relay to Frame Relay, PPP to PPP, or Cisco HDLC to Cisco HDLC.

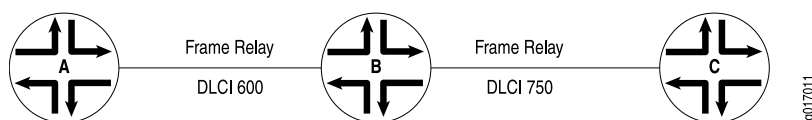
ATM-to-Ethernet interworking cross-connect circuits connect logical interfaces configured on an ATM2 and Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet IQ2 and IQ2-E physical interfaces.

For all TCC connections that connect interfaces, the interfaces can be of unlike types. Mainly, TCC is used for Layer 2.5 virtual private networks (VPNs), but it can also be used as a simple “unlike circuit” switch.

Switching cross-connects join logical interfaces to form what is essentially Layer 2 switching.

Figure 10 on page 230 illustrates a Layer 2 switching circuit cross-connect. In this topology, Router A and Router C have Frame Relay connections to Router B, which is a Juniper Networks router. CCC allows you to configure Router B to act as a Frame Relay (Layer 2) switch. To do this, configure a circuit from Router A to Router C that passes through Router B, effectively configuring Router B as a Frame Relay switch with respect to these routers. This configuration allows Router B to transparently switch packets (frames) between Router A and Router C without regard to the packets' contents or the Layer 3 protocols. The only processing that Router B performs is to translate DLCI 600 to 750.

Figure 10: Layer 2 Switching Circuit Cross-Connect



If the Router A-to-Router B and Router B-to-Router C circuits are PPP, for example, the Link Control Protocol and Network Control Protocol exchanges occur between Router A and Router C. These messages are handled transparently by Router B, allowing Router A and Router C to use various PPP options (such as header or address compression and authentication) that Router B might not support. Similarly, Router A and Router C exchange keepalives, providing circuit-to-circuit connectivity status.

You can configure Layer 2 switching cross-connects on PPP, Cisco HDLC, Frame Relay, Ethernet CCC, Ethernet VLAN, and ATM circuits. With CCC, only like interfaces can be connected in a single cross-connect. With TCC, unlike interfaces can be connected in a single cross-connect. In Layer 2 switching cross-connects, the exchanges take place between point-to-point links.

This chapter discusses the Layer 2 switching cross-connect configuration tasks. For information about MPLS tunneling and LSP stitching, see the [Junos OS MPLS Applications Configuration Guide](#).

For information about Layer 2 and Layer 2.5 VPNs, see the [Junos OS VPNs Configuration Guide](#).

Related Documentation

- Defining the Encapsulation for Switching Cross-Connects on page 231
- Defining the Connection for Switching Cross-Connects on page 234
- Configuring MPLS for Switching Cross-Connects on page 235
- Configuring IS-IS or MPLS Traffic for TCC Interfaces on page 235
- Configuring ATM-to-Ethernet Interworking on page 236
- Example: Configuring a CCC over Frame Relay Encapsulated Interface on page 239
- Example: Configuring a TCC on page 240
- Example: Configuring CCC over Aggregated Ethernet on page 242
- Example: Configuring a Remote LSP CCC over Aggregated Ethernet on page 243
- Example: Configuring ATM-to-Ethernet Interworking on page 245

Defining the Encapsulation for Switching Cross-Connects

To configure Layer 2 or Layer 2.5 switching cross-connects, configure the CCC or TCC encapsulation on the router that is acting as the switch (Router B in Figure 10 on page 230).



NOTE: When you use CCC encapsulation, you can configure the `ccc` family only. Likewise, when you use TCC encapsulation, you can configure the `tcc` family only.

This section contains the following topics:

- Configuring PPP or Cisco HDLC Circuits on page 231
- Configuring ATM Circuits on page 232
- Configuring Frame Relay Circuits on page 232
- Configuring Ethernet CCC Circuits on page 233
- Configuring Ethernet VLAN Circuits on page 234

Configuring PPP or Cisco HDLC Circuits

For PPP or Cisco HDLC circuits, specify the encapsulation by including the **encapsulation** statement at the `[edit interfaces interface-name]` hierarchy level. This statement configures the entire physical device. For these circuits to work, you must configure a logical interface unit 0.

```
[edit interfaces interface-name]
```

```
encapsulation (ppp-ccc | cisco-hdlc-ccc | ppp-tcc | cisco-hdlc-tcc);
unit 0;
```

Configuring ATM Circuits

For ATM circuits, include the **vpi** statement [**edit interfaces *interface-name* atm-options**] hierarchy level:

```
[edit interfaces at-fpc/pic/port]
atm-options {
  vpi vpi-identifier;
}
```

On the logical interface, include the following statements:

```
point-to-point;
encapsulation (atm-ccc-cell-relay | atm-ccc-vc-mux | atm-tcc-vc-mux | atm-tcc-snap);
vci vpi-identifier.vci-identifier;
```

You can include the logical interface statements at the following hierarchy levels:

- [**edit interfaces at-*fpc/pic/port* unit *logical-unit-number***]
- [**edit logical-systems *logical-system-name* interfaces at-*fpc/pic/port* unit *logical-unit-number***]

For each VC, configure whether it is a circuit or a regular logical interface. The default interface type is point-to-point.

Configuring Frame Relay Circuits

For Frame Relay circuits, include the **encapsulation** statement at the [**edit interfaces *interface-name***] hierarchy level:

```
[edit interfaces interface-name]
encapsulation type;
```

On the logical interface, include the following statements:

```
point-to-point;
encapsulation type;
dlci dlci-identifier;
```

You can include the logical interface statements at the following hierarchy levels:

- [**edit interfaces *interface-name* unit *logical-unit-number***]
- [**edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number***]

The encapsulation type can be one of the following:

- Flexible Frame Relay (**flexible-frame-relay**)—Intelligent queuing (IQ) interfaces can use flexible Frame Relay encapsulation. You use flexible Frame Relay encapsulation when you want to configure multiple per-unit Frame Relay encapsulations. This encapsulation type allows you to configure any combination of TCC, CCC, and standard Frame Relay encapsulations on a single physical port. Also, each logical interface can have any DLCI value from 1 through 1022.
- Frame Relay CCC version (**frame-relay-ccc**)—For E1, E3, SONET/SDH, T1, and T3 interfaces, this encapsulation type is the same as standard Frame Relay for DLCIs 0 through 511. DLCIs 512 through 1022 are dedicated to CCC. The logical interface must also have **frame-relay-ccc** encapsulation. When you use this encapsulation type, you can configure the **ccc** family only.
- Frame Relay TCC version (**frame-relay-tcc**)—Similar to Frame Relay CCC and has the same configuration restrictions, but used for circuits with different media on either side of the connection.
- Extended CCC version (**extended-frame-relay-ccc**)—This encapsulation type allows you to dedicate DLCIs 1 through 1022 to CCC. The logical interface must have **frame-relay-ccc** encapsulation. When you use this encapsulation type, you can configure the **ccc** family only.
- Extended TCC version (**extended-frame-relay-tcc**)—Similar to extended Frame Relay CCC, this encapsulation type allows you to dedicate DLCIs 1 through 1022 to TCC, which is used for circuits with different media on either side of the connection.
- Port CCC version (**frame-relay-port-ccc**)—Defined in the IETF document *Frame Relay Encapsulation over Pseudo-Wires* (expired December 2002). This encapsulation type allows you to transparently carry all the DLCIs between two customer edge (CE) routers without explicitly configuring each DLCI on the two provider edge (PE) routers with Frame Relay transport. The connection between the two CE routers can be either user-to-network interface (UNI) or network-to-network interface (NNI); this is completely transparent to the PE routers. The logical interface does not require an encapsulation statement. When you use this encapsulation type, you can configure the **ccc** family only.

For each DLCI, configure whether it is a circuit or a regular logical interface. The DLCI for regular interfaces must be from 1 through 511. For CCC and TCC interfaces, it must be from 512 through 1022. This restriction does not apply to IQ interfaces. The default interface type is point to point.

Configuring Ethernet CCC Circuits

You can configure Ethernet CCC encapsulation on Fast Ethernet, Gigabit Ethernet, and aggregated Ethernet interfaces.



NOTE: CCC over aggregated Ethernet requires an M Series Enhanced Flexible PIC Concentrator (FPC).

For Ethernet CCC circuits, specify the encapsulation by including the **encapsulation** statement at the **[edit interfaces *interface-name*]** hierarchy level. This statement configures the entire physical device.

```
[edit interfaces interface-name]  
encapsulation ethernet-ccc;  
unit logical-unit-number {  
  ...  
}  
[edit interfaces aex]  
encapsulation ethernet-ccc;  
unit logical-unit-number {  
  ...  
}
```

Configuring Ethernet VLAN Circuits

You can configure Ethernet virtual local area network (VLAN) circuits on Fast Ethernet, Gigabit Ethernet, and aggregated Ethernet interfaces. For Ethernet VLAN circuits, specify the encapsulation by including the **encapsulation** statement at the **[edit interfaces *interface-name*]** hierarchy level. This statement configures the entire physical device. You must also enable VLAN tagging. To do this, include the following statements:

```
[edit interfaces interface-name]  
vlan-tagging;  
encapsulation (extended-vlan-ccc | vlan-ccc);  
[edit interfaces aex]  
vlan-tagging;  
encapsulation vlan-ccc;
```

On the logical interface, include the following statements:

```
encapsulation vlan-ccc;  
vlan-id number;
```

You can include the logical interface statements at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]**

Ethernet interfaces in VLAN mode can have multiple logical interfaces. For encapsulation type **vlan-ccc**, VLAN IDs 1 through 511 are reserved for normal VLANs, and VLAN IDs 512 through 1023 are reserved for CCC VLANs. For encapsulation type **extended-vlan-ccc**, VLAN IDs 1 through 4094 are valid. VLAN ID 0 is reserved for tagging the priority of frames.

Defining the Connection for Switching Cross-Connects

To configure Layer 2 switching cross-connects, define the connection between the two circuits. You configure this on the router that is acting as the switch (Router B in Figure 10 on page 230). The connection joins the interface that comes from the circuit's source to the interface that leads to the circuit's destination. When you specify the interface names, include the logical portion of the name, which corresponds to the logical unit number. The cross-connect is bidirectional, so packets received on the first interface are

transmitted out the second interface, and those received on the second interface are transmitted out the first interface.

```
[edit protocols]
connections {
  remote-interface-switch connection-name {
    interface interface-name.unit-number;
  }
  lsp-switch connection-name {
    transmit-lsp lsp-number;
    receive-lsp lsp-number;
  }
}
```

Configuring MPLS for Switching Cross-Connects

For Layer 2 switching cross-connects to work, you must configure MPLS. The following is a minimal MPLS configuration:

```
[edit protocols]
mpls {
  interface (interface-name | all);
}
```

For more information, see the [Junos OS MPLS Applications Configuration Guide](#).

Configuring IS-IS or MPLS Traffic for TCC Interfaces

Layer 2.5 VPNs on T Series, M120, MX Series, and M320 routers support IPv4, IS-IS, and MPLS traffic types. By default, IPv4 traffic runs on T Series, M120, MX Series, and M320 routers and over TCC interfaces. To configure IS-IS (ISO traffic) or MPLS traffic on Layer 2.5 VPNs, you must configure the same traffic type on both ends of the Layer 2.5 VPN.

To specify which traffic can run over a TCC interface, include the **protocols** statement with the appropriate value (**inet**, **mpls**, and **iso**) at the **[edit interfaces *interface-name* unit *logical-unit-number* family tcc]** hierarchy level:

```
[edit interfaces interface-name unit logical-unit-number family tcc]
protocols [ inet iso mpls ];
```



NOTE: Layer 2.5 VPNs running on M Series Multiservice Edge Routers support only IPv4 traffic. IPv6 is not supported on Layer 2.5 VPNs.

When enabling ISO over a Layer 2.5 VPN that is configured on a CE Ethernet interface, you must also include the **point-to-point** statement at the **[edit protocols isis interface *interface-name*]** hierarchy level:

```
[edit protocols isis interface interface-name]
point-to-point;
```

For more information about Layer 2.5 VPNs, see the [Junos OS VPNs Configuration Guide](#) and the [Translational Cross-Connect and Layer 2.5 VPNs Feature Guide](#).

Configuring ATM-to-Ethernet Interworking

The ATM-to-Ethernet interworking feature is useful where ATM2 interfaces are used to terminate ATM DSLAM traffic. The ATM traffic can be forwarded with encapsulation type **ccc** (circuit cross-connect) to a local or remote Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet IQ2 and IQ2-E interface or label-switched path (LSP). The ATM VPI and VCI are converted to stacked VLAN inner and outer VLAN tags.

These ATM-to-Ethernet interworking circuits can be mapped to individual logical interfaces configured on an ATM2 IQ interface and Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet IQ2 and IQ2-E physical interface.

The ATM-to-Ethernet interworking cross-connect essentially provides Layer 2 switching, and statistics are reported at the logical interface level.

During conversion from ATM to Ethernet, the least significant 12 bits of the ATM cell VCI are copied to the Ethernet frame inner VLAN tag. Cells received on an ATM logical interface configured with encapsulation type **vlan-vci-ccc** and falling within the configured VCI range are reassembled into packets and forwarded to a designated Ethernet logical interface that is configured with encapsulation type **vlan-vci-ccc**.

During conversion from Ethernet to ATM, the Ethernet frame inner VLAN tags that fall within the configured range, are copied to the least significant 12 bits of the ATM cell VCI. The ATM logical interface uses its configured VPI when segmenting the Ethernet packets into cells.

ATM-to-Ethernet interworking is supported on M120, M320, and T Series routers.

ATM-to-Ethernet interworking is supported on MX Series routers with aggregated Ethernet, Gigabit Ethernet, and 10-Gigabit Ethernet interfaces. This feature is available on all Enhanced Queuing (EQ) DPCs and Enhanced DPCS for MX Series routers. For more information on MX Series ATM-to-Ethernet interworking, see the *MX Series Solutions Guide*.

The following sections discuss ATM-to-Ethernet interworking:

- Enabling ATM-to-Ethernet Interworking on page 237
- Configuring the Ethernet Interface on page 237
- Configuring Ethernet Encapsulation on page 237
- Configuring the Outer VLAN Identifier on page 237
- Configuring the Inner VLAN Identifier Range on page 237
- Configuring the Physical Interface VPI on page 238
- Configuring the ATM Logical Interface on page 238
- Configuring the Protocol Family on page 238
- Configuring the Logical Interface VPI on page 239
- Configuring the Logical Interface VCI on page 239

Enabling ATM-to-Ethernet Interworking

To enable the ATM-to-Ethernet interworking cross-connect function, include the **vlan-vci-tagging** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]  
vlan-vci-tagging;
```

Configuring the Ethernet Interface

Configure the Ethernet or aggregated Ethernet physical interface by including the **encapsulation** statement with the **vlan-vci-ccc** option at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]  
encapsulation vlan-vci-ccc;
```

When the encapsulation type **vlan-vci-ccc** is configured on the physical interface, all logical interfaces configured on the Ethernet interface must also have the encapsulation type set to **vlan-vci-ccc**.

Configuring Ethernet Encapsulation

Configure the Ethernet logical interface by including the **encapsulation** statement with the **vlan-vci-ccc** option at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level:

```
[edit interfaces interface-name unit logical-unit-number]  
encapsulation vlan-vci-ccc;
```

The chassis configuration cannot contain the **atm-l2circuit-mode** statement if any logical interfaces are configured with the **vlan-vci-ccc** encapsulation option.

Configuring the Outer VLAN Identifier

Configure the Ethernet logical interface outer VLAN ID by including the **vlan-id** statement specifying the outer VLAN ID at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level:

```
[edit interfaces interface-name unit logical-unit-number]  
vlan-id outer-vlan-identifier;
```

It is the administrator's responsibility to ensure that the outer VLAN tag and VPI match and the inner VLAN tags fall within the VCI range of the VPI.

The allowable VPI range is from 0 to 255. So the outer VLAN tags must not be configured for values above 255.

Configuring the Inner VLAN Identifier Range

Configure the Ethernet logical interface inner VLAN ID range by including the **inner-vlan-id-range** statement and specifying the starting VLAN ID and ending VLAN ID at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level:

```
[edit interfaces interface-name unit logical-unit-number]  
inner-vlan-id-range start start-id end end-id;
```

VLAN IDs 0 and 4095 are reserved by IEEE 801.1q and must not be used for the inner or outer VLAN ID.

VCIs 0 through 31 are reserved for ATM management purposes by convention. Therefore inner VLAN IDs 1 through 31 should not be used.

VLAN ID 1 might be used by Ethernet switches for certain bridge management services, so using VLAN ID 1 for the inner or outer VLAN ID is discouraged.

Configuring the Physical Interface VPI

Configure the ATM physical interface VPI by including the **vpi** statement at the **[edit interfaces *interface-name* atm-options]** hierarchy level:

```
[edit interfaces interface-name atm-options]  
vpi virtual-path-identifier;
```

VPI 0 is reserved, and must not be used.

ATM F4/F5 OAM is not supported for VPIs used in ATM-to-Ethernet interworking cross-connects. Any F4/F5 OAM cells received are discarded.

Only one logical interface may be declared per virtual path specified in the **atm-options** statement hierarchy.

It is not necessary to dedicate all the VPIs of an ATM2 interface for ATM-to-Ethernet interworking cross-connects.

Configuring the ATM Logical Interface

Configure the ATM logical interface by including the **encapsulation** statement and specifying the encapsulation type **vlan-vci-ccc** at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level:

```
[edit interfaces interface-name unit logical-unit-number]  
encapsulation vlan-vci-ccc;
```

An ATM logical interface configured with the encapsulation type **vlan-vci-ccc** only supports the **epd-threshold**, **shaping**, **traps | no-traps**, **disable**, and **description** statements. No other configuration statements are supported. ATM interface CoS features are not supported by logical interfaces configured with the encapsulation type **vlan-vci-ccc**.

The ATM2 OC48 PIC does not support the encapsulation type **vlan-vci-ccc**.

The encapsulation type **vlan-vci-ccc** only supports the **ccc** protocol family. Attempts to configure any other interface protocol family are rejected.

Configuring the Protocol Family

Configure the ATM logical interface protocol family by including the **family** statement and specifying the **ccc** option at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level:

```
[edit interfaces interface-name unit logical-unit-number]  
family ccc;
```

Configuring the Logical Interface VPI

Configure the ATM logical interface virtual path identifier by including the **vpi** statement at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level:

```
[edit interfaces interface-name unit logical-unit-number]  
vpi virtual-path-identifier;
```

VPI 0 is reserved, and must not be used.

It is the administrator's responsibility to ensure the outer VLAN tag and VPI match and the inner VLAN tags fall within the VCI range of the VPI.

Once a VPI is used in an ATM-to-Ethernet interworking cross-connect, it cannot be used with any other logical interface, even if the **vpi.vci** value falls outside the VCI range for the cross-connect.

Configuring the Logical Interface VCI

Configure the ATM logical interface virtual channel identifier range by including the **vci-range** statement and specifying the starting VCI and ending VCI at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level:

```
[edit interfaces interface-name unit logical-unit-number]  
vci-range start start-vci end end-vci;
```

Do not use VCIs 0 through 31, which are reserved for ATM management purposes by convention.

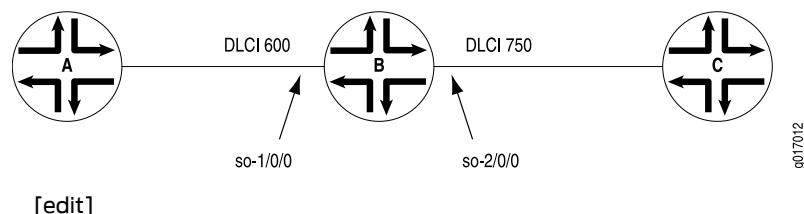
Examples: Configuring Switching Cross-Connects

- Example: Configuring a CCC over Frame Relay Encapsulated Interface on page 239
- Example: Configuring a TCC on page 240
- Example: Configuring CCC over Aggregated Ethernet on page 242
- Example: Configuring a Remote LSP CCC over Aggregated Ethernet on page 243
- Example: Configuring ATM-to-Ethernet Interworking on page 245

Example: Configuring a CCC over Frame Relay Encapsulated Interface

Configure a full-duplex Layer 2 switching circuit cross-connect between Router A and Router C, using a Juniper Networks router, Router B, as the virtual switch. See the topology in Figure 11 on page 239.

Figure 11: Example Topology of a Switching Circuit Cross-Connect with Frame Relay CCC Encapsulation



```

interfaces {
  so-1/0/0 {
    encapsulation frame-relay-ccc;
    unit 1 {
      point-to-point;
      eui-64 frame-relay-ccc;
      dlci 600;
    }
  }
  so-2/0/0 {
    encapsulation frame-relay-ccc;
    unit 2 {
      point-to-point;
      encapsulation frame-relay-ccc;
      dlci 750;
    }
  }
}
protocols {
  connections {
    interface-switch router-a-router-c {
      interface so-1/0/0.1;
      interface so-2/0/0.2;
    }
  }
  mpls {
    interface all;
  }
}

```

Example: Configuring a TCC

Configure a full-duplex switching translational cross-connect with PPP TCC encapsulation between Router A and Router C, using a Juniper Networks router, Router B, as the virtual switch. See the topology in Figure 12 on page 240.

In this topology, Router B has a PPP connection to Router A and an ATM connection to Router C.

Figure 12: Layer 2.5 Switching Translational Cross-Connect



On Router A

```

[edit]
interfaces {
  so-0/1/0 {
    description "to Router B so-1/0/0";
    encapsulation ppp;
    unit 0 {
      family inet {
        address 10.1.1.1/30;
      }
    }
  }
}

```

```
}

```

```
On Router B [edit]
interfaces {
  so-1/0/0 {
    description "to Router A so-0/1/0";
    encapsulation ppp-tcc;
    unit 0 {
    }
  }
  at-1/1/0 {
    description "to Router C at-0/3/0";
    atm-options {
      vpi 0 maximum-vcs 2000;
    }
    unit 32 {
      vci 32;
      encapsulation atm-tcc-vc-mux;
    }
  }
}
[edit]
protocols {
  mpls {
    interface so-1/0/0.0;
    interface at-1/1/0.32;
  }
  connections {
    interface-switch PPP-to-ATM {
      interface so-1/0/0.0;
      interface at-1/1/0.32;
    }
  }
}

```

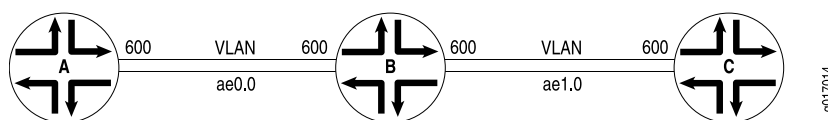
```
On Router C [edit]
interfaces {
  at-0/3/0 {
    description "to Router B at-1/1/0";
    atm-options {
      vpi 0 maximum-vcs 2000;
    }
    unit 32 {
      vci 32;
      encapsulation atm-vc-mux;
      family inet {
        address 10.1.1.2/30;
      }
    }
  }
}

```

Example: Configuring CCC over Aggregated Ethernet

See the topology in Figure 13 on page 242. In this topology, CE Routers A and C have aggregated Ethernet connections to PE Router B. With CCC, you specify that the circuit from Router A is connected to the circuit from Router C. Router B functions as a cross-connect switch between the two circuits. For a back-to-back connection, all VLAN IDs must be the same on Router A through Router C. You configure Router A and Router C as standard aggregated Ethernet interfaces. For more information about aggregated Ethernet, see Aggregated Ethernet Interfaces Overview.

Figure 13: Interface-to-Interface Circuit Cross-Connect over Aggregated Ethernet Interfaces



On Router A

```
[edit interfaces]
ae0 {
  vlan-tagging;
  aggregated-ether-options {
    minimum-links 1;
    link-speed 1g;
  }
  unit 0 {
    vlan-id 600;
    family inet {
      address 192.168.1.1/30;
    }
  }
}
```

On Router B

```
[edit interfaces]
ae0 {
  encapsulation vlan-ccc;
  vlan-tagging;
  aggregated-ether-options {
    minimum-links 1;
    link-speed 1g;
  }
  unit 0 { # CCC switch
    encapsulation vlan-ccc;
    vlan-id 600;
    family ccc;
  }
}
ae1 {
  encapsulation vlan-ccc;
  vlan-tagging;
  aggregated-ether-options {
    minimum-links 1;
    link-speed 100m;
  }
  unit 0 {
    encapsulation vlan-ccc;
  }
}
```



```

        vlan-id 600;
        family ccc;
    }
}
[edit protocols]
mpls {
    interface all;
}
connections {
    interface-switch layer2-cross-connect {
        interface ae0.0;
        interface ae1.0;
    }
}

```

On Router C

```

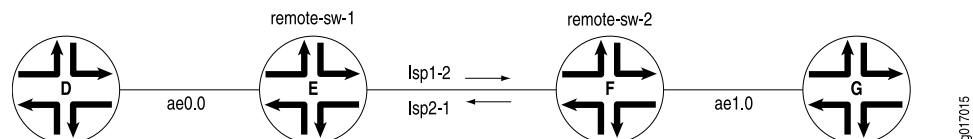
[edit interfaces]
ae1 {
    vlan-tagging;
    aggregated-ether-options {
        minimum-links 1;
        link-speed 1g;
    }
}
unit 0 {
    vlan-id 600;
    family inet {
        address 192.168.1.2/30;
    }
}
}

```

Example: Configuring a Remote LSP CCC over Aggregated Ethernet

See the topology in Figure 14 on page 243. In this topology, CE Router G has an aggregated Ethernet connection to PE Router F. CE Router D has an aggregated Ethernet connection to PE Router E. Router E and Router F have an MPLS LSP between them. With remote CCC, you specify that the circuit from Router D is connected to the circuit from Router G. The circuit from Router D is connected to the LSP on Router E; the circuit from Router G is connected to the LSP on Router F. In other words, **ae0.0** and **ae1.0** are connected using **lsp1-2** and **lsp2-1**. You configure Router D and Router G as standard aggregated Ethernet interfaces. For more information about aggregated Ethernet, see Aggregated Ethernet Interfaces Overview.

Figure 14: Remote Interface-LSP-Interface Circuit Cross-Connect over Aggregated Ethernet Interfaces



On Router D

```

[edit interface]
ae0 {
    aggregated-ether-options {
        minimum-links 1;
    }
}

```

```
    link-speed 1g;
    lacp {
        active;
        periodic fast;
    }
}
unit 0 {
    family inet {
        address 192.168.2.1/30;
    }
}
}
```

On Router E

```
[edit interfaces]
ae0 {
    encapsulation ethernet-ccc;
    aggregated-ether-options {
        minimum-links 1;
        link-speed 100m;
        lacp {
            active;
            periodic fast;
        }
    }
    unit 0 {
        encapsulation vlan-ccc; # default
        family ccc; # default
    }
}
[edit protocols]
mpls {
    interface all;
}
connections {
    remote-interface-switch remote-sw-1 {
        interface ae0.0;
        receive-lsp lsp2_1;
        transmit-lsp lsp1_2;
    }
}
```

On Router F

```
[edit interfaces]
ae1 {
    encapsulation ethernet-ccc;
    aggregated-ether-options {
        minimum-links 1;
        link-speed 100m;
        lacp {
            active;
            periodic fast;
        }
    }
    unit 0 {
        encapsulation vlan-ccc; # default
        family ccc; # default
    }
}
```

```

    }
  }
[edit protocols]
mpls {
  interface all;
}
connections {
  remote-interface-switch remote-sw-2 {
    interface ae1.0;
    receive-lsp lsp1_2;
    transmit-lsp lsp2_1;
  }
}

```

On Router G

```

[edit interface]
ae1 {
  aggregated-ether-options {
    minimum-links 1;
    link-speed 1g;
    lacp {
      active;
      periodic fast;
    }
  }
}
unit 0 {
  family inet {
    address 192.168.2.2/30;
  }
}
}

```

Example: Configuring ATM-to-Ethernet Interworking

The following example shows the configuration of the ATM and Ethernet interfaces for an ATM-to-Ethernet interworking cross connect. In the example ATM DSLAM traffic is terminated on an ATM2 interface. The ATM traffic is forwarded using encapsulation type **vlan-vci-ccc** to a local Ethernet IQ2 and IQ2-E interface. See the topology in Figure 15 on page 245.

Figure 15: ATM-to-Ethernet Interworking



In this example, the ATM traffic comes from the DSLAM to the router on ATM interface **at-4/0/0** and is forwarded out on Ethernet interface **ge-2/2/1**.

```

[edit interfaces]
ge-2/2/1 {
  vlan-vci-tagging;
  encapsulation vlan-vci-ccc;
}

```

```
    unit 0 {  
        encapsulation vlan-vci-ccc;  
        vlan-id 100;  
        inner-vlan-id-range start 100 end 500;  
    }  
}  
at-4/0/0 {  
    atm-options {  
        vpi 100;  
    }  
    unit 0 {  
        encapsulation vlan-vci-ccc;  
        family ccc;  
        vpi 100;  
        vci-range start 100 end 500;  
    }  
}
```

CHAPTER 7

Tracing Interface Operations

- Tracing Interface Operations Overview on page 247
- Tracing Operations of an Individual Router or Switch Interface on page 247
- Tracing Operations of the Interface Process on page 248

Tracing Interface Operations Overview

You can trace the operations of individual router interfaces and those of the interface process (dcd). For a general discussion of tracing and of the precedence of multiple tracing operations, see the *Junos OS System Basics Configuration Guide*.

For information about the operations of Virtual Router Resolution Protocol (VRRP)-enabled interfaces, see the *Junos OS High Availability Configuration Guide*.

Related Documentation

- Tracing Operations of an Individual Router or Switch Interface on page 247
- Tracing Operations of the Interface Process on page 248

Tracing Operations of an Individual Router or Switch Interface

To trace the operations of individual router or switch interfaces, include the **traceoptions** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]  
traceoptions {  
  flag flag;  
}
```

You can specify the following interface tracing flags:

- **all**—Trace all interface operations.
- **event**—Trace all interface events.
- **ipc**—Trace all interface interprocess communication (IPC) messages.
- **media**—Trace all interface media changes.

The interfaces **traceoptions** statement does not support a trace file. The logging is done by the kernel, so the tracing information is placed in the system **syslog** files.

Tracing Operations of the Interface Process

To trace the operations of the router or switch interface process, dcd, include the **traceoptions** statement at the **[edit interfaces]** hierarchy level:

```
[edit interfaces]
traceoptions {
  file <filename> <files number> <match regular-expression> <size size> <world-readable |
    no-world-readable>;
  flag <flag> <disable>;
  no-remote-trace;
}
```

By default, interface process operations are placed in the file named dcd and three 1-MB files of tracing information are maintained.

You can specify the following flags in the **interfaces traceoptions** statement:

- **change-events**—Log changes that produce configuration events.
- **config-states**—Log the configuration state machine changes.
- **kernel**—Log configuration IPC messages to kernel.
- **kernel-detail**—Log details of configuration messages to kernel.

For general information about tracing, see the tracing and logging information in the [Junos OS System Basics Configuration Guide](#).

PART 3

Configuring Special Router Interfaces

- [Displaying the Internal Ethernet Interface on page 251](#)
- [Configuring Discard Interfaces on page 255](#)
- [Configuring Demultiplexing Interfaces on page 257](#)
- [Configuring the Loopback Interface on page 267](#)

CHAPTER 8

Displaying the Internal Ethernet Interface

- Internal Ethernet Interface Overview on page 251
- Displaying the Internal Ethernet Interface for M Series, MX Series, and Most T Series Routers on page 252
- Displaying Internal Ethernet Interfaces for a Routing Matrix with a TX Matrix Plus Router on page 252

Internal Ethernet Interface Overview

The router internal Ethernet interface connects the Routing Engine with the router's packet forwarding components. The Junos OS automatically configures internal Ethernet interfaces. For M Series, MX Series, and T Series routers not configured in a routing matrix with a TX Matrix Plus router, the internal Ethernet interface is **fxp1**.

For TX Matrix Plus Routers and for T1600 Core Routers with RE-C1800 configured in a routing matrix, the Junos OS automatically creates the router's management Ethernet interface, **em0**. To use **em0** as a management port, you must configure its logical port, **em0.0**, with a valid IP address.



NOTE: Do not modify or remove the configuration for the internal Ethernet interface that the Junos OS automatically configures. If you do, the router will stop functioning.

Related Documentation

- TX Matrix Plus and T1600 Router (Routing Matrix) Management Ethernet Interfaces
- T1600 Routers (Routing Matrix) Internal Ethernet Interfaces
- Displaying the Internal Ethernet Interface for M Series, MX Series, and Most T Series Routers on page 252
- Displaying Internal Ethernet Interfaces for a Routing Matrix with a TX Matrix Plus Router on page 252
- show interfaces (M Series and T Series Router Management and Internal Ethernet)

Displaying the Internal Ethernet Interface for M Series, MX Series, and Most T Series Routers

The following example shows the command output for the **show configuration** command for an M Series or MX Series router, or a T Series router not configured in a routing matrix with a TX Matrix Plus router. The example shows only the portion of the **interfaces** stanza that shows the configuration of the internal Ethernet interface.

```
user@host> show configuration
...
interfaces {
  ...
  fxp1 {
    unit 0 {
      family tnp {
        address 1;
      }
    }
  }
}
```

Displaying Internal Ethernet Interfaces for a Routing Matrix with a TX Matrix Plus Router

The router internal Ethernet interface connects the Routing Engine with the router's packet forwarding components. The Junos OS automatically configures internal Ethernet interfaces. For TX Matrix Plus routers, the internal Ethernet interfaces are **ixgbe0** and **ixgbe1**. For T1600 routers configured in a routing matrix, the internal Ethernet interfaces are **bcm0** and **em1**. For more information about internal Ethernet interfaces, see "Understanding Internal Ethernet Interfaces" on page 30.



NOTE: Do not modify or remove the configuration for the internal Ethernet interface that the Junos OS automatically configures. If you do, the router will stop functioning.

The following example is a sequence of **show interfaces** commands issued in a Junos OS command-line interface (CLI) session with a TX Matrix Plus router in a routing matrix. In the example, the TX Matrix Plus router, which is also called the switch-fabric chassis (SFC), is known by the IP host name **host-sfc-0** and contains redundant Routing Engines. The commands display information about the management Ethernet interface and both internal Ethernet interfaces configured on the Routing Engine to which you are currently logged in:

```
user@host-sfc-0> show interfaces em0 terse
Interface      Admin Link Proto Local Remote
em0            up    up
em0.0          up    up   inet  192.168.35.95/24

user@host-sfc-0> show interfaces ixgbe0 terse
Interface      Admin Link Proto Local Remote
ixgbe0         up    up
ixgbe0.0       up    up   inet  10.34.0.4/8
```

```

162.0.0.4/2
inet6 fe80::200:ff:fe22:4/64
fec0::a:22:0:4/64
tnp 0x22000004

```

```

user@host-sfc-0> show interfaces ixgbe1 terse
Interface      Admin Link Proto  Local          Remote
ixgbe1         up    up
ixgbe1.0       up    up  inet   10.34.0.4/8
               162.0.0.4/2
               inet6  fe80::200:1ff:fe22:4/64
               fec0::a:22:0:4/64
               tnp    0x22000004

```

The following example is a sequence of **show interfaces** commands issued in a CLI session with a T1600 router in a routing matrix. In the example, the T1600 router, which is also called the line-card chassis (LCC), is known by the IP host name **host-sfc-0-lcc-2** and contains redundant Routing Engines.

This T1600 router is connected to the routing matrix through a connection in the TXP-SIB-F13 in slot 2 of the SCC. The commands display information about the management Ethernet interface and both internal Ethernet interfaces configured on the Routing Engine to which you are currently logged in:



NOTE: In a routing matrix, the **show interfaces** command displays information about the current router only. If you are logged in to the TX Matrix Plus router, the **show interfaces** command output does not include information about any of the attached T1600 routers. To display interface information about a specific T1600 router in the routing matrix, you must first log in to that router.

The previous example shows a CLI session with the TX Matrix Plus router. To display interface information about the T1600 router known as **host-sfc-0-lcc-2**, first use the **request routing-engine login** command to log in to that LCC.

```

user@host-sfc-0> request routing-engine login lcc 2
--- JUNOS 9.6I built 2009-06-22 18:13:04 UTC
% cli
warning: This chassis is a Line Card Chassis (LCC) in a multichassis system.
warning: Use of interactive commands should be limited to debugging.
warning: Normal CLI access is provided by the Switch Fabric Chassis (SFC).
warning: Please logout and log into the SFC to use CLI.

```

```

user@host-sfc-0-lcc-2> show interfaces em0 terse
Interface      Admin Link Proto  Local          Remote
em0            up    up
em0.0          up    up  inet   192.168.35.117/24

```

```

user@host-sfc-0-lcc-2> show interfaces bcm0 terse
Interface      Admin Link Proto  Local          Remote
bcm0           up    up
bcm0.0         up    up  inet   10.1.0.5/8
               129.0.0.5/2

```

```

inet6    fe80::201:1ff:fe01:5/64
         fec0::a:1:0:5/64
tnp      0x1000005

```

user@host-sfc-0-1cc-2> show interfaces em1 terse

Interface	Admin	Link	Proto	Local	Remote
em1	up	up			
em1.0	up	up	inet	10.1.0.5/8 129.0.0.5/2	
			inet6	fe80::201:1ff:fe01:5/64 fec0::a:1:0:5/64	
			tnp	0x1000005	

CHAPTER 9

Configuring Discard Interfaces

- Discard Interfaces Overview on page 255
- Example: Discard Interface on page 256

Discard Interfaces Overview

On the routing platform, you can configure one physical discard interface, **dsc**. The discard interface allows you to identify the ingress point of a denial-of-service (DoS) attack. When your network is under attack, the target host IP address is identified, and the local policy forwards attacking packets to the discard interface. When traffic is routed out of the discard interface, the traffic is silently discarded.

You can configure the **inet** family protocol on the discard interface, which allows you to apply an output filter to the interface. If you apply an output filter to the interface, the action specified by the filter is executed before the traffic is discarded.

Once you configure a discard interface, you must then configure a local policy to forward attacking traffic to the discard interface. For a complete discussion about using the discard interface to protect your network against DoS attacks, see the [Junos OS Routing Policy Configuration Guide](#).

Keep the following guidelines in mind when configuring the discard interface:

- Only the logical interface unit 0 is supported.
- The **filter** and **address** statements are optional.
- Although you can configure an input filter and a filter group, these configuration statements have no effect because traffic is not transmitted from the discard interface.
- The **show interface** command is not relevant for the discard interface.
- The discard interface does not support class of service (CoS).

Related Documentation

- Example: Discard Interface on page 256

Example: Discard Interface

To configure a discard interface, include the following statements at the **[edit interfaces]** hierarchy level:

```
[edit interfaces]
dsc {
  unit 0 {
    family inet {
      filter {
        output filter-name;
      }
      address address {
        destination address;
      }
    }
  }
}
```

Configuring Demultiplexing Interfaces

- Demultiplexing Interface Overview on page 257
- Configuring an IP Demultiplexing Interface on page 258
- Configuring an IP Demux Underlying Interface on page 259
- Configuring a VLAN Demultiplexing Interface on page 260
- Configuring a VLAN Demux Underlying Interface on page 261
- Specifying the Demux Underlying Interface on page 261
- Configuring IP Demux Prefixes on page 262
- Configuring MAC Address Validation on Static Demux Interfaces on page 263
- Example: Configuring a Demux Interface on page 263

Demultiplexing Interface Overview

Demultiplexing (demux) interfaces are logical interfaces that share a common, underlying interface. You can configure either IP demultiplexing interfaces or VLAN demultiplexing interfaces. IP demux interfaces use the IP source or destination address to demultiplex received packets when the subscriber is not uniquely identified by a Layer 2 circuit. VLAN demux interfaces use the VLAN ID to demultiplex received packets when the subscriber is not uniquely identified. Demux interfaces are supported on M120 or MX Series routers only.



NOTE: You can also configure demux interfaces dynamically. For information about how to configure dynamic IP demux or dynamic VLAN demux interfaces, see the *Subscriber Access Configuration Guide*.

Related Documentation

- Configuring an IP Demultiplexing Interface on page 258
- Configuring an IP Demux Underlying Interface on page 259
- Configuring a VLAN Demultiplexing Interface on page 260
- Configuring a VLAN Demux Underlying Interface on page 261
- Specifying the Demux Underlying Interface on page 261
- Configuring IP Demux Prefixes on page 262

- Binding VLAN IDs to Logical Interfaces
- Associating VLAN IDs to VLAN Demux Interfaces
- Example: Configuring a Demux Interface on page 263
- Subscriber Interfaces and Demultiplexing Overview

Configuring an IP Demultiplexing Interface

To configure a demux interface, include the following statements at the **[edit interfaces]** hierarchy level:

```
[edit interfaces]
interface-name {
  unit logical-unit-number {
    ... logical-interface-configuration ...
  }
}
demux0 {
  unit logical-unit-number {
    demux-options {
      underlying-interface interface-name;
    }
    family family {
      demux-destination {
        destination-prefix;
      }
      demux-destination {
        source-prefix;
      }
      mac-validate (loose | strict)
      unnumbered-address interface-name <preferred-source-address address>;
    }
  }
}
```

Keep the following guidelines in mind when configuring the demux interface:

- Demux interfaces are supported on M120 or MX Series routers only.
- You can configure only one **demux0** interface per chassis, but you can define logical demux interfaces on top of it (for example, **demux0.1**, **demux0.2**, and so on).
- You must associate demux interfaces with an underlying logical interface.



NOTE: IP demux interfaces currently support only Gigabit Ethernet, Fast Ethernet, 10-Gigabit Ethernet, and aggregated Ethernet underlying interfaces.

- The demux underlying interface must reside on the same logical system as the demux interfaces that you configure over it.

- IP demux interfaces currently supports the Internet Protocol version 4 (IPv4) suite **inet** and Internet Protocol version 6 (IPv6) suite **inet6** family types.
- You can configure more than one demux prefix for a given demux unit. However, you cannot configure the exact same demux prefix on two different demux units with the same underlying interface.
- You can configure overlapping demux prefixes on two different demux units with the same underlying prefix. However, under this configuration, best match rules apply (in other words, the most specific prefix wins).
- If the address in a received packet does not match any demux prefix, the packet is logically received on the underlying interface. For this reason, the underlying interface is often referred to as the “primary” interface.

Related Documentation

- Configuring an IP Demux Underlying Interface on page 259
- Specifying the Demux Underlying Interface on page 261
- Demultiplexing Interface Overview on page 257
- Configuring IP Demux Prefixes on page 262

Configuring an IP Demux Underlying Interface

An IP demux interface uses an underlying logical interface to receive packets.



NOTE: IP demux interfaces support only Gigabit Ethernet, Fast Ethernet, 10-Gigabit Ethernet, or aggregated Ethernet underlying interfaces.

To determine which IP demux interface to use, the destination or source prefix is matched against the destination or source address of packets that the underlying interface receives. The underlying interface family type must match the demux interface prefix type.

To configure a logical interface as an IP demux underlying interface, configure the logical demultiplexing destination or source family type. To configure, include the **demux-destination** or **demux-source** statement:

```

interfaces {
  interface-name {
    unit logical-unit-number {
      (demux-destination family | demux-source family);
    }
  }
}

```

You can include these statements at the following hierarchy levels:

- [edit]
- [edit logical-system *logical-system-name*]
- [edit logical-system *logical-system-name* routing-instances *routing-instance-name*]

- Related Documentation**
- Specifying the Demux Underlying Interface on page 261
 - Demultiplexing Interface Overview on page 257
 - Configuring an IP Demultiplexing Interface on page 258
 - Configuring IP Demux Prefixes on page 262

Configuring a VLAN Demultiplexing Interface

To configure a VLAN demux interface, include the following statements at the **[edit interfaces]** hierarchy level:

```
[edit interfaces]
demux0 {
  unit logical-unit-number {
    vlan-id number;
    demux-options {
      underlying-interface interface-name;
    }
    family family {
      demux-destination {
        destination-prefix;
      }
      demux-destination {
        source-prefix;
      }
      mac-validate (loose | strict)
      unnumbered-address interface-name <preferred-source-address address>;
    }
  }
}
```

Keep the following guidelines in mind when configuring the demux interface:

- Demux interfaces are supported on M120, M320, or MX Series routers only.
- You can configure only one **demux0** interface per chassis.
- You must associate VLAN demux interfaces with an underlying physical interface.



NOTE: VLAN demux interfaces currently support Gigabit Ethernet, Fast Ethernet, 10-Gigabit Ethernet, and aggregated Ethernet underlying interfaces.

- The demux underlying interface must reside on the same logical system as the demux interfaces that you configure over it.
- VLAN demux interfaces support the Internet Protocol version 4 (IPv4) suite **inet** and Internet Protocol version 6 (IPv6) **inet6** family types.
- If the address in a received packet does not match any demux VLAN ID, the packet is logically received on the underlying interface. For this reason, the underlying interface is often referred to as the “primary” interface.

Configuring a VLAN Demux Underlying Interface

A VLAN demux interface uses an underlying logical interface to receive packets.



NOTE: VLAN demux interfaces support only Gigabit Ethernet, Fast Ethernet, 10-Gigabit Ethernet, or aggregated Ethernet underlying interfaces.

VLAN demux subscriber interfaces over aggregated Ethernet physical interfaces are supported only for MX Series routers that have only Trio MPCs installed. If the router has other cards in addition to Trio MPCs, the CLI accepts the configuration but errors are reported when the subscriber interfaces are brought up.

To determine which VLAN demux interface to use, the VLAN ID is matched against that which the underlying interface receives.

To configure a logical interface as an VLAN demux underlying interface, include the **underlying-interface** statement at the **[edit interfaces *demux0* unit *logical-unit-number* demux-options]** hierarchy level and the **vlan-id** statement at the **[edit interfaces *demux0* unit *logical-unit-number*]** hierarchy level:

```
interfaces {
  demux0 {
    unit logical-unit-number {
      vlan-id number;
      demux-options {
        underlying-interface interface-name;
      }
      family family {
        address address;
      }
    }
  }
}
```

You can include these statements at the following hierarchy levels:

- **[edit]**
- **[edit logical-system *logical-system-name*]**
- **[edit logical-system *logical-system-name* routing-instances *routing-instance-name*]**

Specifying the Demux Underlying Interface

You must specify an underlying interface for static demux interfaces to use. This underlying interface must reside on the same logical system as the demux interface.

To specify the logical underlying interface, include the **underlying-interface** statement:

```
interfaces {
  demux0 {
```

```
    unit logical-unit-number {
      demux-options {
        underlying-interface interface-name;
      }
    }
  }
}
```

You can include these statements at the following hierarchy levels:

- [edit]
- [edit logical-systems *logical-system-name*]
- [edit logical-systems *logical-system-name* routing-instances *routing-instance-name*]

Related Documentation

- Configuring IP Demux Prefixes on page 262
- Demultiplexing Interface Overview on page 257
- Configuring an IP Demultiplexing Interface on page 258
- Configuring an IP Demux Underlying Interface on page 259
- Configuring a VLAN Demultiplexing Interface on page 260
- Configuring a VLAN Demux Underlying Interface on page 261

Configuring IP Demux Prefixes

You configure demux prefixes for use by the underlying interface. The demux prefixes can represent individual hosts or networks. For a given demux interface unit, you can configure either demux source or demux destination prefixes but not both. You can choose not to configure a demux source or demux destination prefix. This type of configuration results in a transmit-only interface.

To configure IP demux prefixes, include the **demux-destination** or **demux-source** statement:

```
interfaces {
  demux0 {
    unit logical-unit-number {
      family family;
      demux-destination {
        destination-prefix;
      }
    }
    family family;
    demux-source {
      source-prefix;
    }
  }
}
```

You can include these statements at the following hierarchy levels:

- **[edit]**
- **[edit logical-systems *logical-system-name*]**
- **[edit logical-systems *logical-system-name* routing-instances *routing-instance-name*]**

Related Documentation

- Demultiplexing Interface Overview on page 257
- Configuring an IP Demultiplexing Interface on page 258
- Configuring an IP Demux Underlying Interface on page 259
- Specifying the Demux Underlying Interface on page 261

Configuring MAC Address Validation on Static Demux Interfaces

MAC address validation enables the router to validate that received packets contain a trusted IP source and an Ethernet MAC source address.

MAC address validation is supported on static demux interfaces on MX Series routers only.

There are two types of MAC address validation that you can configure:

- **Loose**—Forwards packets when both the IP source address and the MAC source address match one of the trusted address tuples.

Drops packets when the IP source address matches one of the trusted tuples, but the MAC address does not support the MAC address of the tuple

Continues to forward packets when the source address of the incoming packet does not match any of the trusted IP addresses.

- **Strict**—Forwards packets when both the IP source address and the MAC source address match one of the trusted address tuples.

Drops packets when the MAC address does not match the tuple's MAC source address, or when IP source address of the incoming packet does not match any of the trusted IP addresses.

To configure MAC address validation on static Ethernet interfaces, include the **mac-validate (loose | strict)** statement at the **[edit interfaces demux0 unit *logical-unit-number* family *family*]** hierarchy level.

```
[edit interfaces demux0 unit logical-unit-number family family]  
mac-validate (loose | strict);
```

Example: Configuring a Demux Interface

Configure two VLANs, each with two IP demux interfaces. One VLAN demultiplexes based on the source address; the other VLAN demultiplexes based on the destination address.



NOTE: This example is not intended to depict any realistic deployment; it is intended to demonstrate many possible CLI variations.

```
[edit]
interfaces {
  fe-0/0/0 {
    vlan-tagging;
    unit 100 {
      vlan-id 100;
      demux-source inet; # Enable demux of inet prefixes
      family inet {
        address 10.1.1.1/24;
        filter {
          input vlan1-primary-in-filter;
          output vlan1-primary-out-filter;
        }
        mac-validate loose;
      }
    }
    unit 200 {
      vlan-id 200;
      demux-destination inet; # Enable demux of inet using destination addresses
      family inet {
        address 20.1.1.1/24;
      }
    }
    unit 300 {
      vlan-id 300;
      demux-source inet; # Enable demux of inet using source addresses
      family inet {
        address 20.1.2.1/24;
      }
    }
  }
}
demux0 {
  unit 101 {
    description vlan1-sub1;
    demux-options {
      underlying-interface fe-0/0/0.100;
    }
    family inet {
      demux-source 10.1.1.0/24;
      filter {
        input vlan1-sub1-in-filter;
        output vlan1-sub1-out-filter;
      }
      mac-validate loose;
    }
  }
  unit 102 {
    description vlan1-sub2;
    demux-options {
      underlying-interface fe-0/0/0.100;
```

```
}
family inet {
  demux-source {
    10.1.0.0/16;
    10.2.1.0/24;
  }
  filter {
    input vlan1-sub2-in-filter;
    output vlan1-sub2-out-filter;
  }
  mac-validate loose;
}
}
unit 202 {
  description vlan2-sub2;
  demux-options {
    underlying-interface fe-0/0/0.200;
  }
  family inet {
    demux-destination 100.1.2.0/24;
  }
}
unit 302 {
  description vlan2-sub2;
  demux-options {
    underlying-interface fe-0/0/0.300;
  }
  family inet {
    demux-source 100.1.2.0/24;
  }
}
}
}
```


Configuring the Loopback Interface

- Configuring the Loopback Interface on page 267

Configuring the Loopback Interface

On the router, you can configure one physical loopback interface, **lo0**, and one or more addresses on the interface.

To configure the physical loopback interface, include the following statements at the **[edit interfaces]** hierarchy level:

```
[edit interfaces]
lo0 {
  unit 0 {
    family inet {
      address loopback-address;
      address <loopback-address2>;
      ...
    }
    family inet6 {
      address loopback-address;
    }
  }
}
```

When specifying the loopback address, do not include a destination prefix. Also, in most cases, do not specify a loopback address on any unit other than unit 0.



NOTE: For Layer 3 virtual private networks (VPNs), you can configure multiple logical units for the loopback interface. This allows you to configure a logical loopback interface for each virtual routing and forwarding (VRF) routing instance. For more information, see the [Junos OS VPNs Configuration Guide](#).

For some applications, such as SSL for Junos XML protocol, the address for the interface **lo0.0** must be 127.0.0.1.

You can configure loopback interfaces using a subnetwork address for both **inet** and **inet6** address families. Many protocols require a subnetwork address as their source

address. Configuring a subnetwork loopback address as a donor interface enables these protocols to run on unnumbered interfaces.

If you configure the loopback interface, it is automatically used for unnumbered interfaces. If you do not configure the loopback interface, the router chooses the first interface to come online as the default. If you configure more than one address on the loopback interface, we recommend that you configure one to be the primary address to ensure that it is selected for use with unnumbered interfaces. By default, the primary address is used as the source address when packets originate from the interface.

For more information about unnumbered interfaces, see “Configuring an Unnumbered Interface” on page 190. For more information about primary addresses, see “Configuring the Interface Address” on page 182.

Example: Configuring the Loopback Interface

Configure two addresses on the loopback interface with host routes:

```
[edit]
user@host# edit interfaces lo0 unit 0 family inet
[edit interfaces lo0 unit 0 family inet]
user@host# set address 172.16.0.1
[edit interfaces lo0 unit 0 family inet]
user@host# set address 10.0.0.1
[edit interfaces lo0 unit 0 family inet]
user@host# top
[edit]
user@host# show
interfaces {
  lo0 {
    unit 0 {
      family inet {
        10.0.0.1;
        127.0.0.1;
        172.16.0.1;
      }
    }
  }
}
```

Configure two addresses on the loopback interface with subnetwork routes:

```
[edit]
user@host# edit interfaces lo0 unit 0 family inet
[edit interfaces lo0 unit 0 family inet]
user@host# set address 192.16.0.1/24
[edit interfaces lo0 unit 0 family inet]
user@host# set address 10.2.0.1/16
[edit interfaces lo0 unit 0 family inet]
user@host# top
[edit]
user@host# show
interfaces {
  lo0 {
    unit 0 {
```

```

        family inet {
            10.2.0.1/16;
            127.0.0.1/32;
            192.16.0.1/24;
        }
    }
}

```

Configure an IP and an IPv6 address on the loopback interface with subnetwork routes:

```

[edit]
user@host# edit interfaces lo0 unit 0 family inet
[edit interfaces lo0 unit 0 family inet]
user@host# set address 192.16.0.1/24
[edit interfaces lo0 unit 0 family inet]
user@host# up
[edit interfaces lo0 unit 0 family]
user@host# edit interfaces lo0 unit 0 family inet6
[edit interfaces lo0 unit 0 family inet6]
user@host# set address 3ffe::1:200:f8ff:fe75:50df/64
[edit interfaces lo0 unit 0 family inet6]
user@host# top
[edit]
user@host# show
interfaces {
    lo0 {
        unit 0 {
            family inet {
                127.0.0.1/32;
                192.16.0.1/24;
            }
            family inet6 {
                3ffe::1:200:f8ff:fe75:50df/64;
            }
        }
    }
}

```


PART 4

Configuring Serial Interfaces

- [Configuring Serial Interfaces on page 273](#)

CHAPTER 12

Configuring Serial Interfaces

- Serial Interfaces Overview on page 273
- Example: Physical Interface Configuration Statements for Serial Interfaces on page 274
- Configuring the Serial Line Protocol on page 275
- Configuring the Serial Clocking Mode on page 279
- Configuring the Serial Idle Cycle Flag on page 281
- Configuring the Serial Signal Handling on page 281
- Configuring the Serial DTR Circuit on page 284
- Configuring Serial Signal Polarities on page 284
- Configuring Serial Loopback Capability on page 285
- Configuring Serial Line Encoding on page 287

Serial Interfaces Overview

Devices that communicate over a serial interface are divided into two classes: data terminal equipment (DTE) and data circuit-terminating equipment (DCE). Juniper Networks Serial Physical Interface Cards (PICs) have two ports per PIC and support full-duplex data transmission. These PICs support DTE mode only. On the Serial PIC, you can configure three types of serial interfaces:

- EIA-530—An Electronics Industries Alliance (EIA) standard for the interconnection of DTE and DCE using serial binary data interchange with control information exchanged on separate control circuits.
- V.35—An ITU-T standard describing a synchronous, physical layer protocol used for communications between a network access device and a packet network. V.35 is most commonly used in the United States and in Europe.
- X.21—An ITU-T standard for serial communications over synchronous digital lines. The X.21 protocol is used primarily in Europe and Japan.

The following standards apply to serial interfaces:

- TIA/EIA Standard 530, *High-Speed 25-Position Interface for Data Terminal Equipment and Data Circuit-Terminating Equipment*, defines the signals on the cable and specifies the connector at the end of the cable.
- TIA/EIA Standard 232, *Interface between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange*, describes the physical interface and protocol for serial data communication.
- ITU-T Recommendation V.35, *Data Transmission at 48 kbit/s Using 60-108 kHz Group Band Circuits*. Note that the Juniper Networks Serial PIC supports V.35 interfaces with speeds higher than 48 kilobits per second.
- ITU-T Recommendation X.21, *Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment for Synchronous Operation on Public Data Networks*.

There are no serial interface-specific logical properties. For information about general logical properties that you can configure, see [Configuring Logical Interface Properties](#). On J Series routers, link fragmentation and interleaving (LFI) and Multilink Point-to-Point Protocol (MLPPP) support has been extended to serial interfaces. This support on serial interfaces is the same as the existing LFI and MLPPP support on T1 and E1 interfaces.

Related Documentation

- [Example: Physical Interface Configuration Statements for Serial Interfaces on page 274](#)
- [Configuring the Serial Line Protocol on page 275](#)
- [Configuring the Serial Clocking Mode on page 279](#)
- [Configuring the Serial Idle Cycle Flag on page 281](#)
- [Configuring the Serial Signal Handling on page 281](#)
- [Configuring the Serial DTR Circuit on page 284](#)
- [Configuring Serial Signal Polarities on page 284](#)
- [Configuring Serial Loopback Capability on page 285](#)
- [Configuring Serial Line Encoding on page 287](#)

Example: Physical Interface Configuration Statements for Serial Interfaces

To configure serial physical interface properties, include the **serial-options** statement at the **[edit interfaces se-*pim*/*O*/*port*]** hierarchy level for J Series routers, or at the **[edit interfaces se-*fpc*/*pic*/*port*]** hierarchy level for M Series and T Series routers:

```
[edit interfaces se-fpc/pic/port]  
serial-options {  
  clock-rate rate;  
  clocking-mode (dce | internal | loop);  
  control-polarity (negative | positive);  
  cts-polarity (negative | positive);  
  dcd-polarity (negative | positive);  
  dce-options {  
    control-signal (assert | de-assert | normal);  
    cts (ignore | normal | require);  
    dcd (ignore | normal | require);
```



```

    dsr (ignore | normal | require);
    dtr signal-handling-option;
    ignore-all;
    indication (ignore | normal | require);
    rts (assert | de-assert | normal);
    tm (ignore | normal | require);
  }
  dsr-polarity (negative | positive);
  dte-options {
    control-signal (assert | de-assert | normal);
    cts (ignore | normal | require);
    dcd (ignore | normal | require);
    dsr (ignore | normal | require);
    dtr signal-handling-option;
    ignore-all;
    indication (ignore | normal | require);
    rts (assert | de-assert | normal);
    tm (ignore | normal | require);
  }
  dtr-circuit (negative | positive);
  dtr-polarity (negative | positive);
  encoding (nrz | nrzi);
  idle-cycle-flag flag;
  indication-polarity (negative | positive);
  line-protocol protocol;
  loopback mode;
  rts-polarity (negative | positive);
  tm-polarity (negative | positive);
  transmit-clock invert;
}

```

Configuring the Serial Line Protocol

By default, serial interfaces use the EIA-530 line protocol. You can configure each port on the PIC independently to use one of the following line protocols:

- EIA-530
- V.35
- X.21

To configure the serial line protocol, include the **line-protocol** statement, specifying the **eia530**, **v.35**, or **x.21** option:

```
line-protocol protocol;
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *se-pim*/*O/port* serial-options]
- [edit interfaces *se-fpc/pic/port* serial-options]

For more information about serial interfaces, see the following sections:

- Serial Interface Default Settings on page 276
- Invalid Serial Interface Statements on page 277

Serial Interface Default Settings

- EIA-530 Interface Default Settings on page 276
- V.35 Interface Default Settings on page 276
- X.21 Interface Default Settings on page 277

EIA-530 Interface Default Settings

If you do not include the **line-protocol** statement or if you explicitly configure the default EIA-530 line protocol, the default settings are as follows:

```
dce-options | dte-options {  
  cts normal;  
  dcd normal;  
  dsr normal;  
  dtr normal;  
  rts normal;  
  tm normal;  
}  
clock-rate 16.384mhz;  
clocking-mode loop;  
cts-polarity positive;  
dcd-polarity positive;  
dsr-polarity positive;  
dtr-circuit balanced;  
dtr-polarity positive;  
encoding nrz;  
rts-polarity positive;  
tm-polarity positive;
```



NOTE: On M Series routers, you can set the DCE clocking mode for EIA-530 interfaces and commit. An error message is not displayed and the CLI is not blocked.

You can include the **line-protocol** statement at the following hierarchy levels:

- [edit interfaces *se-pim/0/port* serial-options]
- [edit interfaces *se-fpc/pic/port* serial-options]

V.35 Interface Default Settings

If you include the **line-protocol v.35** statement, the default settings are as follows:

```
dce-options | dte-options {  
  cts normal;  
  dcd normal;  
  dsr normal;  
  dtr normal;
```

```

    rts normal;
}
clock-rate 16.384mhz;
clocking-mode loop;
cts-polarity positive;
dcd-polarity positive;
dsr-polarity positive;
dtr-circuit balanced;
dtr-polarity positive;
encoding nrz;
rts-polarity positive;

```

You can include the **line-protocol** statement at the following hierarchy levels:

- [edit interfaces *se-pim*/*O/port* serial-options]
- [edit interfaces *se-fpc/pic/port* serial-options]

X.21 Interface Default Settings

If you include the **line-protocol x.21** statement, the default settings are as follows:

```

dce-options | dte-options {
    control-signal normal;
    indication normal;
}
clock-rate 16.384mhz;
clocking-mode loop;
control-polarity positive;
encoding nrz;
indication-polarity positive;

```

You can include the **line-protocol** statement at the following hierarchy levels:

- [edit interfaces *se-pim*/*O/port* serial-options]
- [edit interfaces *se-fpc/pic/port* serial-options]

Invalid Serial Interface Statements

The following sections show the invalid configuration statements for each type of serial interface. If you include the following statements in the configuration, an error message indicates the location of the error and the configuration is not activated.

- Invalid EIA-530 Interface Statements on page 277
- Invalid V.35 interface Statements on page 278
- Invalid X.21 Interface Statements on page 278

Invalid EIA-530 Interface Statements

If you do not include the **line-protocol** statement or if you explicitly configure the default EIA-530 line protocol, the following statements are invalid:

```

dce-options | dte-options {
    control-signal (assert | de-assert | normal);
    indication (ignore | normal | require);
}

```

```
}  
control-polarity (negative | positive);  
indication-polarity (negative | positive);
```

You can include the **line-protocol** statement at the following hierarchy levels:

- [edit interfaces *se-pim/0/port* serial-options]
- [edit interfaces *se-fpc/pic/port* serial-options]

Invalid V.35 interface Statements

If you include the **line-protocol v.35** statement, the following statements are invalid:

```
dce-options | dte-options {  
    control-signal (assert | de-assert | normal);  
    indication (ignore | normal | require);  
    tm (ignore | normal | require);  
}  
control-polarity (negative | positive);  
indication-polarity (negative | positive);  
loopback (dce-local | dce-remote);  
tm-polarity (negative | positive);
```

You can include the **line-protocol** statement at the following hierarchy levels:

- [edit interfaces *se-pim/0/port* serial-options]
- [edit interfaces *se-fpc/pic/port* serial-options]

Invalid X.21 Interface Statements

If you include the **line-protocol x.21** statement, the following statements are invalid:

```
dce-options | dte-options {  
    cts (ignore | normal | require);  
    dcd (ignore | normal | require);  
    dsr (ignore | normal | require);  
    dtr (assert | de-assert | normal);  
    rts (assert | de-assert | normal);  
    tm (ignore | normal | require);  
}  
clocking-mode (dce | internal);  
cts-polarity (negative | positive);  
dce-polarity (negative | positive);  
dsr-polarity (negative | positive);  
dtr-circuit (balanced | unbalanced);  
dtr-polarity (negative | positive);  
loopback (dce-local | dce-remote);  
rts-polarity (negative | positive);  
tm-polarity (negative | positive);
```

You can include the **line-protocol** statement at the following hierarchy levels:

- [edit interfaces *se-pim/0/port* serial-options]
- [edit interfaces *se-fpc/pic/port* serial-options]

Configuring the Serial Clocking Mode

By default, serial interfaces use loop clocking mode. For EIA-530 and V.35 interfaces, you can configure each port on the PIC independently to use loop, DCE, or internal clocking mode. For X.21 interfaces, only loop clocking mode is supported.

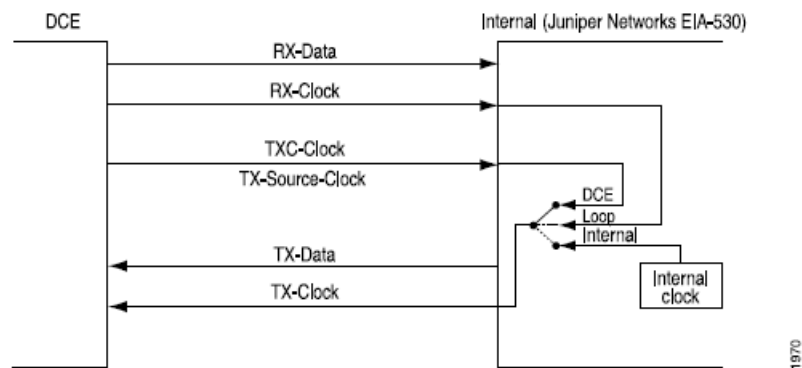
The three clocking modes work as follows:

- Loop clocking mode—Uses the DCE's RX clock to clock data from the DCE to the DTE.
- DCE clocking mode—Uses the TXC clock, which is generated by the DCE specifically to be used by the DTE as the DTE's transmit clock.
- Internal clocking mode—Also known as line timing, uses an internally generated clock. You can configure the speed of this clock by including the **clock-rate** statement at the **[edit interfaces se-pim/0/port serial-options]** or **[edit interfaces se-fpc/pic/port dte-options]** hierarchy levels. For more information about the DTE clock rate, see “Configuring the DTE Clock Rate” on page 280.

Note that DCE clocking mode and loop clocking mode use external clocks generated by the DCE.

Figure 16 on page 279 shows the clock sources of loop, DCE, and internal clocking modes.

Figure 16: Serial Interface Clocking Mode



To configure the clocking mode of a serial interface, include the **clocking-mode** statement:

```
clocking-mode (dce | internal | loop);
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces se-pim/0/port serial-options]**
- **[edit interfaces se-fpc/pic/port serial-options]**

For more information about clocking on serial interfaces, see the following sections:

- Inverting the Serial Interface Transmit Clock on page 280
- Configuring the DTE Clock Rate on page 280

Inverting the Serial Interface Transmit Clock

When an externally timed clocking mode (DCE or loop) is used, long cables might introduce a phase shift of the DTE-transmitted clock and data. At high speeds, this phase shift might cause errors. Inverting the transmit clock corrects the phase shift, thereby reducing error rates.

By default, the transmit clock is not inverted. To invert the transmit clock, include the **transmit-clock invert** statement:

```
transmit-clock invert;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces se-*pim*/0/*port* serial-options]**
- **[edit interfaces se-*fpc*/*pic*/*port* serial-options]**

Configuring the DTE Clock Rate

By default, the serial interface has a clock rate of 16.384 MHz. For EIA-530 and V.35 interfaces with internal clocking mode configured, you can configure the clock rate. For more information about internal clocking mode, see “Configuring the Serial Clocking Mode” on page 279.

To configure the clock rate, include the **clock-rate** statement:

```
clock-rate rate;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces se-*pim*/0/*port* serial-options]**
- **[edit interfaces se-*fpc*/*pic*/*port* serial-options]**

You can configure the following interface speeds:

- 2.048 MHz
- 2.341 MHz
- 2.731 MHz
- 3.277 MHz
- 4.096 MHz
- 5.461 MHz
- 8.192 MHz
- 16.384 MHz

Although the serial interface is intended for use at the default rate of 16.384 MHz, you might need to use a slower rate if any of the following conditions prevail:

- The interconnecting cable is too long for effective operation.
- The interconnecting cable is exposed to an extraneous noise source that might cause an unwanted voltage in excess of +1 volt measured differentially between the signal conductor and circuit common at the load end of the cable, with a 50-ohm resistor substituted for the generator.
- You need to minimize interference with other signals.
- You need to invert signals.

For detailed information about the relationship between signaling rate and interface cable distance, see the following standards:

- EIA-422-A, *Electrical Characteristics of Balanced Voltage Digital Interface Circuits*
- EIA-423-A, *Electrical Characteristics of Unbalanced Voltage Digital Interface Circuits*

Configuring the Serial Idle Cycle Flag

By default, a serial interface on J Series routers transmits the value 0x7E in the idle cycles. To have the interface transmit the value 0xFF (all ones) instead, include the **idle-cycle-flag** statement at the **[edit interfaces *interface-name* serial-options]** hierarchy level, specifying the **ones** option:

```
[edit interfaces interface-name serial-options]
idle-cycle-flag ones;
```

To explicitly configure the default value of 0x7E, include the **idle-cycle-flag** statement with the **flags** option:

```
[edit interfaces interface-name serial-options]
idle-cycle-flag flags;
```

Configuring the Serial Signal Handling

By default, normal signal handling is enabled for all signals. For each signal, the **normal** option applies to the normal signal handling for that signal, as defined by the following standards:

- TIA/EIA Standard 530
- ITU-T Recommendation V.35
- ITU-T Recommendation X.21

Table 26 on page 281 shows the serial interface modes that support each signal type.

Table 26: Signal Handling by Serial Interface Type

Signal	Serial Interfaces
From-DCE signals	
Clear to send (CTS)	EIA-530 and V.35

Table 26: Signal Handling by Serial Interface Type (*continued*)

Signal	Serial Interfaces
Data carrier detect (DCD)	EIA-530 and V.35
Data set ready (DSR)	EIA-530 and V.35
Indication	X.21 only
Test mode (TM)	EIA-530 only
To-DCE signals	
Control signal	X.21 only
Data transfer ready (DTR)	EIA-530 and V.35
Request to send (RTS)	EIA-530 and V.35

You configure serial interface signal characteristics by including the **dce-options** or **dte-options** statement:

```
dce-options | dte-options {
  control-signal (assert | de-assert | normal);
  cts (ignore | normal | require);
  dcd (ignore | normal | require);
  dsr (ignore | normal | require);
  dtr signal-handling-option;
  ignore-all;
  indication (ignore | normal | require);
  rts (assert | de-assert | normal);
  tm (ignore | normal | require);
}
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *se-pim*/0/*port* serial-options]
- [edit interfaces *se-fpc*/*pic*/*port* serial-options]

For EIA-530 and V.35 interfaces, configure to-DCE signals by including the **dtr** and **rts** statements, specifying the **assert**, **de-assert**, or **normal** option:

```
dtr (assert | de-assert | normal);
rts (assert | de-assert | normal);
```

For X.21 interfaces, configure to-DCE signals by including the **control-signal** statement, specifying the **assert**, **de-assert**, or **normal** option:

```
control-signal (assert | de-assert | normal);
```

Assertion is when the positive side of a given signal is at potential high-level output voltage (Voh), while the negative side of the same signal is at potential low-level output voltage

(Vol). *Deassertion* is when the positive side of a given signal is at potential Vol, while the negative side of the same signal is at potential Voh.

For the DTR signal, you can configure normal signal handling using the signal for automatic resynchronization by including the **dtr** statement, and specifying the **auto-synchronize** option:

```
dtr {
  auto-synchronize {
    duration milliseconds;
    interval seconds;
  }
}
```

The pulse duration of resynchronization can be from 1 through 1000 milliseconds. The offset interval for resynchronization can be from 1 through 31 seconds.

For EIA-530 and V.35 interfaces, configure from-DCE signals by including the **cts**, **dcd**, and **dsr** statements, specifying the **ignore**, **normal**, or **require** option:

```
cts (ignore | normal | require);
dcd (ignore | normal | require);
dsr (ignore | normal | require);
```

For X.21 interfaces, configure from-DCE signals by including the **indication** statement, specifying the **ignore**, **normal**, or **require** option:

```
indication (ignore | normal | require);
```

For EIA-530 interfaces only, you can configure from-DCE test-mode (TM) signaling by including the **tm** statement, specifying the **ignore**, **normal**, or **require** option:

```
tm (ignore | normal | require);
```

To specify that the from-DCE signal must be asserted, include the **require** option in the configuration. To specify that the from-DCE signal must be ignored, include the **ignore** option in the configuration.



NOTE: For V.35 and X.21 interfaces, you cannot include the **tm** statement in the configuration.

For X.21 interfaces, you cannot include the **cts**, **dcd**, **dsr**, **dtr**, and **rts** statements in the configuration.

For EIA-530 and V.35 interfaces, you cannot include the **control-signal** and **indication** statements in the configuration.

For a complete list of serial options statements that are not supported by each serial interface mode, see “Invalid Serial Interface Statements” on page 277.

To return to the default normal signal handling, delete the **require**, **ignore**, **assert**, **de-assert**, or **auto-synchronize** statement from the configuration, as shown in the following example:

[edit]

user@host# **delete interfaces se-fpc/pic/port dte-options control-leads cts require**

To explicitly configure normal signal handling, include the **control-signal** statement with the **normal** option:

control-signal normal;

You can configure the serial interface to ignore all control leads by including the **ignore-all** statement:

ignore-all;

You can include the **ignore-all** statement in the configuration only if you do not explicitly enable other signal handling options at the **[edit interfaces se-pim/0/port serial-options dce-options]** or **[edit interfaces se-fpc/pic/port serial-options dte-options]** hierarchy levels.

You can include the **control-signal**, **cts**, **dcd**, **dsr**, **dtr**, **indication**, **rts**, and **tm** statements at the following hierarchy levels:

- **[edit interfaces se-pim/0/port serial-options dte-options]**
- **[edit interfaces se-fpc/pic/port serial-options dte-options]**

Configuring the Serial DTR Circuit

A balanced circuit has two currents that are equal in magnitude and opposite in phase. An unbalanced circuit has one current and a ground; if a pair of terminals is unbalanced, one side is connected to electrical ground and the other carries the signal. By default, the DTR circuit is balanced.

For EIA-530 and V.35 interfaces, configure the DTR circuit by including the **dtr-circuit** statement:

dtr-circuit (balanced | unbalanced);

You can include this statement at the following hierarchy levels:

- **[edit interfaces se-pim/0/port serial-options]**
- **[edit interfaces se-fpc/pic/port serial-options]**

Configuring Serial Signal Polarities

Serial interfaces use a differential protocol signaling technique. Of the two serial signals associated with a circuit, the one referred to as the A signal is denoted with a plus sign, and the one referred to as the B signal is denoted with a minus sign; for example, DTR+ and DTR-. If DTR is low, then DTR+ is negative with respect to DTR-. If DTR is high, then DTR+ is positive with respect to DTR-.

By default, all signal polarities are positive. You can reverse this polarity on a Juniper Networks serial interface. You might need to do this if signals are miswired as a result of reversed polarities.

For EIA-530 and V.35 interfaces, configure signal polarities by including the **cts-polarity**, **dcd-polarity**, **dsr-polarity**, **dtr-polarity**, **rts-polarity**, and **tm-polarity** statements:

```
cts-polarity (negative | positive);
dcd-polarity (negative | positive);
dsr-polarity (negative | positive);
dtr-polarity (negative | positive);
rts-polarity (negative | positive);
tm-polarity (negative | positive);
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *se-pim/0/port* serial-options]
- [edit interfaces *se-fpc/pic/port* serial-options]

For X.21 interfaces, configure signal polarities by including the **control-polarity** and **indication-polarity** statements:

```
control-polarity (negative | positive);
indication-polarity (negative | positive);
```

You can include these statements at the following hierarchy levels:

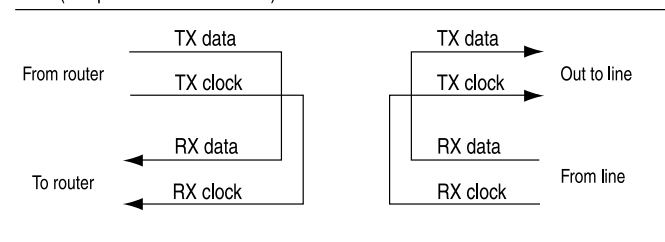
- [edit interfaces *se-pim/0/port* serial-options]
- [edit interfaces *se-fpc/pic/port* serial-options]

Configuring Serial Loopback Capability

From the router, remote line interface unit (LIU) loopback loops the TX (transmit) data and TX clock back to the router as RX (receive) data and RX clock. From the line, LIU loopback loops the RX data and RX clock back out the line as TX data and TX clock, as shown in Figure 17 on page 285.

Figure 17: Serial Interface LIU Loopback

DTE (Juniper Networks EIA-530)

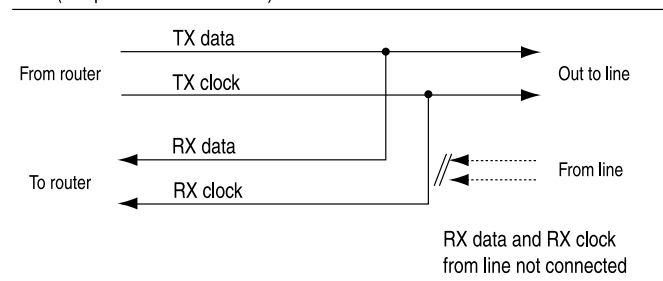


1972

DCE local and DCE remote control the EIA-530 interface-specific signals for enabling local and remote loopback on the link partner DCE. Local loopback is shown in Figure 18 on page 286.

Figure 18: Serial Interface Local Loopback

DTE (Juniper Networks EIA-530)



1971

For EIA-530 interfaces, you can configure DCE local, DCE remote, local, and remote (LIU) loopback capability.

For V.35, you can configure remote LIU and local loopback capability. DCE local and DCE remote loopbacks are not supported on V.35 and X.21 interfaces. Local and remote loopbacks are not supported on X.21 interfaces.

To configure the loopback capability on a serial interface, include the **loopback** statement, specifying the **dce-local**, **dce-remote**, **local**, or **remote** option:

```
loopback mode;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *se-pim/0/port* serial-options]
- [edit interfaces *se-fpc/pic/port* serial-options]

To disable the loopback capability, remove the **loopback** statement from the configuration:

```
[edit]
user@host# delete interfaces se-fpc/pic/port serial-options loopback
```

You can determine whether there is an internal or external problem by checking the error counters in the output of the **show interface *se-fpc/pic/port* extensive** command:

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

Example: Configuring Serial Loopback Capability

To determine the source of a problem, loop packets on the local router, the local DCE, the remote DCE, and the remote line interface unit (LIU). To do this, include the **no-keepalives** and **encapsulation cisco-hdlc** statements at the [edit interfaces *se-fpc/pic/port*] hierarchy level, and the **loopback local** option at the [edit interfaces *se-pim/0/port* serial-options] or [edit interfaces *se-fpc/pic/port* serial-options] hierarchy level. With this configuration, the link stays up, so you can loop ping packets to a remote router. The **loopback local** statement causes the interface to loop within the PIC just before the data reaches the transceiver.

```
[edit interfaces]
se-1/0/0 {
  no-keepalives;
  encapsulation cisco-hdlc;
```

```
serial-options {  
    loopback local;  
}  
unit 0 {  
    family inet {  
        address 10.100.100.1/24;  
    }  
}
```

Configuring Serial Line Encoding

By default, serial interfaces use non-return to zero (NRZ) line encoding. You can configure non-return to zero inverted (NRZI) line encoding if necessary.

To have the interface use NRZI line encoding, include the **encoding** statement, specifying the **nrzi** option:

```
encoding nrzi;
```

To explicitly configure the default NRZ line encoding, include the **encoding** statement, specifying the **nrz** option:

```
encoding nrz;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *se-pim/0/port* serial-options]
- [edit interfaces *se-fpc/pic/port* serial-options]

When setting the line encoding parameter, you must set the same value for paired ports. Ports 0 and 1 must share the same value.

PART 5

Interfaces Fundamentals Configuration Statements

- Summary of Interfaces Fundamentals Configuration Statements on page 291



Summary of Interfaces Fundamentals Configuration Statements

The following descriptions explain each of the interface configuration statements. The statements are organized alphabetically.

802.3ad

Syntax	<pre>802.3ad { aex (primary backup); lacp { port-priority; } }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> fastether-options], [edit interfaces <i>interface-name</i> gletcher-options]
Release Information	Statement introduced before Junos OS Release 7.4. primary and backup options added in Junos OS Release 8.3.
Description	Specify aggregated Ethernet logical interface number.
Options	aex —Aggregated Ethernet logical interface number. Range: 0 through 15 primary —For link protection configurations, specify the primary link for egress traffic. backup —For link protection configurations, specify the backup link for egress traffic.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring an Aggregated Ethernet Interface Configuring Aggregated Ethernet Link Protection

accept

Syntax	<code>accept (any dhcp-v4 dhcp-v6 inet inet6 pppoe);</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> auto-configure stacked-vlan-ranges dynamic-profile <i>profile-name</i>],</code> <code>[edit interfaces <i>interface-name</i> auto-configure vlan-ranges dynamic-profile <i>profile-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 9.5. dhcp-v4 option added in Junos OS Release 10.0. dhcp-v6 , inet6 and pppoe options added in Junos OS Release 10.2. any option added in Junos OS Release 10.4.
Description	Specify the type of VLAN Ethernet packet accepted by an interface that is associated with a VLAN dynamic profile or stacked VLAN dynamic profile.
Options	<p>any—Any packet type. Specifies that any incoming packets trigger the dynamic creation of a VLAN with properties determined by the auto-configure interface configuration stanza and associated profile attributes. This option is used when configuring wholesaling in a Layer 2 network.</p> <p>dhcp-v4—IPv4 DHCP packet type. Specifies that incoming IPv4 DHCP discover packets trigger the dynamic creation of a VLAN with properties determined by the auto-configure interface configuration stanza and associated profile attributes</p> <div> NOTE: The DHCP-specific mac-address and option-82 options are rejected if the accept statement is not set to dhcp-v4.</div> <p>dhcp-v6—IPv6 DHCP packet type. Specifies that incoming IPv6 DHCP discover packets trigger the dynamic creation of a VLAN with properties determined by the auto-configure interface configuration stanza and associated profile attributes.</p> <p>inet—IPv4 Ethernet and ARP packet type.</p> <p>inet6—IPv6 Ethernet packet type.</p> <p>pppoe—Point-to-Point Protocol over Ethernet packet type.</p> <div> NOTE: The pppoe VLAN Ethernet packet type option is supported only for Trio MPC/MIC interfaces on MX Series Routers.</div>
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.

- Related Documentation**
- Configuring the VLAN Ethernet Packet Type for Single-Tag VLAN Dynamic Profiles
 - Configuring the VLAN Ethernet Packet Type for Stacked VLAN Dynamic Profiles
 - Configuring VLAN Interfaces for the Layer 2 Wholesale Solution

accept-source-mac

Syntax	<pre> accept-source-mac { mac-address <i>mac-address</i> { policer { input <i>cos-policer-name</i>; output <i>cos-policer-name</i>; } } } </pre>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]</p>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For Gigabit Ethernet intelligent queuing (IQ) interfaces only, accept traffic from and to the specified remote media access control (MAC) address.</p> <p>The accept-source-mac statement is equivalent to the source-address-filter statement, which is valid for aggregated Ethernet, Fast Ethernet, and Gigabit Ethernet interfaces only.</p> <p>On untagged Gigabit Ethernet interfaces you should not configure the source-address-filter statement and the accept-source-mac statement simultaneously. On tagged Gigabit Ethernet interfaces you should not configure the source-address-filter statement and the accept-source-mac statement with an identical MAC address specified in both filters.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring MAC Address Filtering • source-filtering on page 715

access-concentrator

Syntax	<code>access-concentrator <i>name</i>;</code>
Hierarchy Level	<code>[edit dynamic-profiles <i>profile-name</i> interfaces demux0 unit <i>logical-unit-number</i> family pppoe],</code> <code>[edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family pppoe],</code> <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family pppoe],</code> <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> pppoe-options],</code> <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> pppoe-underlying-options],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family pppoe],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> pppoe-options],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> pppoe-underlying-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4. Support at the <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> pppoe-underlying-options]</code> and <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> pppoe-underlying-options]</code> hierarchy levels introduced in Junos OS Release 10.1. (MX Series routers with Trio MPCs only) The <code>[edit ... family pppoe]</code> hierarchies introduced in Junos OS Release 11.2.
Description	(J Series Services Routers with Point-to-Point Protocol over Ethernet (PPPoE) interfaces) Configure the name of the access concentrator. (Intelligent Queuing 2 (IQ2) PICs on M120 and M320 routers; Trio MPCs on MX Series routers) Configure an alternative access concentrator name in the AC-NAME tag in a PPPoE control packet for use with a dynamic PPPoE subscriber interface. If you do not configure the access concentrator name, the AC-NAME tag contains the system name.
Options	<i>name</i> —Name of the access concentrator.
Required Privilege Level	<code>interface</code> —To view this statement in the configuration. <code>interface-control</code> —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Identifying the Access ConcentratorConfiguring the PPPoE Family for an Underlying InterfaceConfiguring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles<i>Junos OS Interfaces and Routing Configuration Guide</i>

access-profile

Syntax	<code>access-profile name;</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> auto-configure vlan-ranges], [edit interfaces <i>interface-name</i> auto-configure stacked-vlan-ranges], [edit interfaces <i>interface-name</i> ppp-options chap], [edit interfaces <i>interface-name</i> ppp-options pap], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options chap], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options pap], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options chap], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options pap]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4. Support for PAP added in Junos OS Release 8.3. Support for VLAN and stacked VLAN ranges added in Junos OS Release 10.0.</p>
Description	<p>For CHAP authentication, the mapping between peer names (or “clients”) and the secrets associated with their respective links. For PAP authentication, the peer's username and password.</p> <p>For Asynchronous Transfer Mode 2 (ATM2) IQ interfaces only, you can configure a Challenge Handshake Authentication Protocol (CHAP) access profile on the logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:</p> <ul style="list-style-type: none"> • atm-ppp-llc—PPP over AAL5 logical link control (LLC) encapsulation. • atm-ppp-vc-mux—PPP over AAL5 multiplex encapsulation. <p>For VLAN and stacked VLAN authentication, the access profile containing the RADIUS accounting and authentication information for the VLAN or stacked VLAN ranges.</p>
Options	name —Name of the access profile.
Required Privilege Level	<p>interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring the PPP Challenge Handshake Authentication Protocol on page 121 • Configuring the PPP Password Authentication Protocol on page 124 • default-chap-secret on page 382 • Junos OS System Basics Configuration Guide

accounting

Syntax	<pre>accounting { destination-class-usage; source-class-usage { direction; } }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Enable IP packet counters on an interface. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Enabling Source Class and Destination Class Usage on page 218

accounting-profile

Syntax	<pre>accounting-profile <i>name</i>;</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit interfaces interface-range <i>name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Enable collection of accounting data for the specified physical or logical interface or interface range.
Options	<i>name</i> —Name of the accounting profile.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Applying an Accounting Profile to the Physical Interface on page 140Applying an Accounting Profile to the Logical Interface on page 166

acfc

Syntax	acfc;
Hierarchy Level	[edit interfaces <i>interface-name</i> ppp-options compression], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options compression], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options compression]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For interfaces with PPP encapsulation, configure compression of the Data Link Layer address and control fields. The acfc option is not supported with frame-relay-ppp encapsulation.</p> <p>On M320, M120, and T Series routers, address and control field compression (ACFC) is not supported for any ISO family protocols. Do not include the acfc statement at the [edit interfaces <i>interface-name</i> ppp-options compression] hierarchy level when you include the family iso statement at the [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>] hierarchy level.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring PPP Address and Control Field Compression on page 129

acknowledge-retries

Syntax	<code>acknowledge-retries <i>number</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For link services and voice services interfaces only, configure the number of retransmission attempts to be made for consecutive hello or remove link messages following the expiration of the acknowledgment timer.
Options	<i>number</i> —Number of retransmission attempts to be made following the expiration of the acknowledgment timer. Range: 1 through 5 Default: 2
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide• action-red-differential-delay on page 304• hello-timer on page 464

acknowledge-timer

Syntax	<code>acknowledge-timer <i>milliseconds</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For link services and voice services interfaces only, configure the maximum time, in milliseconds, to wait for an add link acknowledgment, hello acknowledgment, or remove link acknowledgment message.
Options	<p>milliseconds—Time, in milliseconds, to wait for an add link acknowledgment, hello acknowledgment, or remove link acknowledgment message.</p> <p>Range: 1 through 10 milliseconds</p> <p>Default: 4 milliseconds</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide• address on page 306, hello-timer on page 464• hello-timer on page 464

action

See the following sections:

- [action \(OAM\) on page 300](#)
- [action \(Policer\) on page 300](#)

action (OAM)

Syntax	<pre>action { link-down; send-critical-event; syslog; }</pre>
Hierarchy Level	[edit protocols oam ethernet link-fault-management action-profile]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Define the action or actions to be taken when the OAM fault event occurs.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Specifying the Actions to Be Taken for Link-Fault Management Events

action (Policer)

Syntax	<pre>action { loss-priority high then discard; }</pre>
Hierarchy Level	[edit firewall three-color-policer <i>policer-name</i>]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	This statement discards high loss priority traffic as part of a configuration using tricolor marking on a logical interface.
Required Privilege Level	firewall—To view this statement in the configuration. firewall-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Class of Service Configuration Guide• logical-interface-policer on page 545

action-profile

See the following sections:

- [action-profile \(Applying to CFM\) on page 301](#)
- [action-profile \(Defining for CFM\) on page 302](#)
- [action-profile \(Defining for LFM\) on page 303](#)

action-profile (Applying to CFM)

Syntax	<code>action-profile <i>profile-name</i>;</code>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>domain-name</i> maintenance-association <i>ma-name</i> mep <i>mep-id</i> remote-mep <i>mep-id</i>]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	Identify the action profile to use.
Options	<i>profile-name</i> —Name of the action profile to use.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring a Maintenance Endpoint

action-profile (Defining for CFM)

Syntax `action-profile profile-name {
 event {
 adjacency-loss
 interface-status-tlv
 port-status-tlv
 rdi;
 }
 action {
 interface-down;
 }
 default-actions {
 interface-down;
 }
 }`

Hierarchy Level `[edit protocols oam ethernet connectivity-fault-management]`

Release Information Statement introduced in Junos OS Release 8.4.

Description Configure a name and default action for an action profile.

Options *profile-name*—Name of the action profile.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

Related Documentation

- [Configuring a Connectivity Fault Management Action Profile](#)
- [default-actions on page 381](#)
- [event \(CFM\)](#)
- [interface-down on page 498](#)

action-profile (Defining for LFM)

Syntax

```

action-profile profile-name {
  action {
    link-down;
    send-critical-event;
    syslog;
  }
  event {
    link-adjacency-loss;
    link-event-rate {
      frame-error count;
      frame-period count;
      frame-period-summary count;
      symbol-period count;
    }
    protocol-down;
  }
}

```

Hierarchy Level [edit protocols oam ethernet link-fault-management]

Release Information Statement introduced in Junos OS Release 8.5.

Description Configure a name, one or more actions, and the events that trigger the action for an action profile.

Options *profile-name*—Name of the action profile.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring an OAM Action Profile

action-red-differential-delay

Syntax	<code>action-red-differential-delay (disable-tx remove-link);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For link services and voice services interfaces only, configure the action to be taken when the differential delay exceeds the red limit.
Options	disable-tx —Disable transmission on the bundle link. remove-link —Remove bundle link from service. Default: <code>disable-tx</code>
Required Privilege Level	<code>interface</code> —To view this statement in the configuration. <code>interface-control</code> —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide• remote on page 674• yellow-differential-delay on page 811

activation-delay

Syntax	<code>activation-delay seconds;</code>
Hierarchy Level	[edit interfaces <code>dlIn</code> unit <i>logical-unit-number</i> dialer-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	(J Series Services Routers) For ISDN interfaces, configure the ISDN dialer activation delay. Used only for dialer backup and dialer watch cases.
Options	seconds —Interval before the backup interface is activated after the primary interface has gone down. Range: 1 through 4,294,967,295 seconds
Required Privilege Level	<code>interface</code> —To view this statement in the configuration. <code>interface-control</code> —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Dialer Interface• Junos OS Interfaces and Routing Configuration Guide

activation-priority

Syntax	<code>activation-priority <i>priority</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> dynamic-call-admission-control], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> dynamic-call-admission-control]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	(J4350 and J6350 Services Routers supporting voice over IP with the TGM550 media gateway module) For Fast Ethernet and Gigabit Ethernet interfaces, ISDN BRI interfaces, and serial interfaces with PPP or Frame Relay encapsulation, configure the dynamic call admission control (dynamic CAC) activation priority value.
Options	<p><i>priority</i>—The activation priority in which the interface is used for providing call bandwidth. The interface with the highest activation priority value is used as the primary link for providing call bandwidth. If the primary link becomes unavailable, the TGM550 switches over to the next active interface with the highest activation priority value, and so on.</p> <p>Range: 0 through 255</p> <p>Default: 50</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Dynamic Call Admission Control on page 174 Junos OS Services Interfaces Configuration Guide Junos OS Interfaces and Routing Configuration Guide

address

```

Syntax  address address {
        arp ip-address (mac | multicast-mac) mac-address <publish>;
        broadcast address;
        destination address;
        destination-profile name;
        eui-64;
        master-only;
        multipoint-destination address dlcid dlcid-identifier;
        multipoint-destination address {
            epd-threshold cells;
            inverse-arp;
            oam-liveness {
                up-count cells;
                down-count cells;
            }
            oam-period (disable | seconds);
            shaping {
                (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
                 length);
                queue-length number;
            }
            vci vpi-identifier.vci-identifier;
        }
        primary;
        preferred;
        (vrrp-group | vrrp-inet6-group) group-number {
            (accept-data | no-accept-data);
            advertise-interval seconds;
            authentication-type authentication;
            authentication-key key;
            fast-interval milliseconds;
            (preempt | no-preempt) {
                hold-time seconds;
            }
            priority-number number;
            track {
                priority-cost seconds;
                priority-hold-time interface-name {
                    interface priority;
                    bandwidth-threshold bits-per-second {
                        priority;
                    }
                }
            }
            route ip-address/mask routing-instance instance-name priority-cost cost;
        }
        virtual-address [ addresses ];
    }
}

```

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* family *family*],
 [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*
 family *family*]

Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.1 for QFX Series switches.
Description	Configure the interface address.



NOTE: The vrrp High Availability functionality is not available for the QFX Series switches

Options	address —Address of the interface. The remaining statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring the Protocol Family on page 180 negotiate-address on page 590 unnumbered-address (Ethernet) on page 778 <i>Junos OS System Basics Configuration Guide</i>

advertise-interval

Syntax	<code>advertise-interval <i>milliseconds</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Modify the Automatic Protection Switching (APS) interval at which the protect and working routers send packets to their neighbors to advertise that they are operational. A router considers its neighbor to be operational for a period, called the hold time, that is, by default, three times the advertisement interval.
Options	milliseconds —Interval between advertisement packets. Range: 1 through 65,534 milliseconds Default: 1000 milliseconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring APS Timers

age

Syntax	age (30m 10m 1m 30s 10s);
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management linktrace]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Time to wait (in minutes or seconds) for a response. If no response is received, the request and response entry is deleted from the linktrace database.
Default	10 minutes
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Linktrace Protocol in CFM

agent-specifier

Syntax	<pre> agent-specifier { aci <i>circuit-id-string</i> ari <i>remote-id-string</i> { drop; delay <i>seconds</i>; terminate; dynamic-profile <i>profile-name</i>; routing-instance <i>routing-instance-name</i>; static-interface <i>interface-name</i>; } } </pre>
Hierarchy Level	[edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i>]
Release Information	<p>Statement introduced in Junos OS Release 10.0.</p> <p>drop, delay, terminate, dynamic-profile, routing-instance, and static-interface options introduced in Junos OS Release 10.2.</p>
Description	<p>Specify the action taken by the interface for the specified agent circuit identifier/agent remote identifier (ACI/ARI) pair when the interface receives a PPPoE Active Discovery Initiation (PADI) control packet that includes the vendor-specific tag with ACI/ARI pair information. You can configure an ACI/ARI pair for a named service, empty service, or any service in a PPPoE service name table. A maximum of 8000 ACI/ARI pairs are supported per PPPoE service name table. You can distribute the ACI/ARI pairs in any combination among the named, empty, and any service entries in the service name table.</p> <p>You can use an asterisk (*) as a wildcard character to match ACI/ARI pairs, the ACI alone, or the ARI alone. The asterisk can be placed only at the beginning, the end, or both the beginning and end of the identifier string. You can also specify an asterisk alone for either the ACI or the ARI. You cannot specify only an asterisk for both the ACI and the ARI. When you specify a single asterisk as the identifier, that identifier is ignored in the PADI packet.</p> <p>For example, suppose you care about matching only the ACI and do not care what value the ARI has in the PADI packet, or even whether the packet contains an ARI value. In this case you can set the remote-id-string to a single asterisk. Then the interface ignores the ARI received in the packet and the interface takes action based only on matching the specified ACI.</p>
Default	The default action is terminate.
Options	<p>aci <i>circuit-id-string</i>—Identifier for the agent circuit ID that corresponds to the DSLAM interface that initiated the service request. This is a string of up to 63 characters.</p> <p>ari <i>remote-id-string</i>—Identifier for the subscriber associated with the DSLAM interface that initiated the service request. This is a string of up to 63 characters.</p> <p>The remaining statements are explained separately.</p>

Required Privilege	interface—To view this statement in the configuration.
Level	interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring PPPoE Service Name Tables• Assigning an ACI/ARI Pair to a Service Name and Configuring the Action Taken When the Client Request Includes ACI/ARI Information

aggregate

See the following sections:

- [aggregate \(Gigabit Ethernet CoS Policer\) on page 311](#)
- [aggregate \(Hierarchical Policer\) on page 312](#)
- [aggregate \(SONET/SDH\) on page 312](#)

aggregate (Gigabit Ethernet CoS Policer)

Syntax	<pre>aggregate { bandwidth-limit <i>bps</i>; burst-size-limit <i>bytes</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> <i>gigether-options</i> ethernet-switch-profile ethernet-policer-profile policer <i>cos-policer-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Define a policer to apply to nonpremium traffic. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Gigabit Ethernet Policers• premium (Hierarchical Policer) on page 651• ieee802.1p on page 474

aggregate (Hierarchical Policer)

Syntax	<pre>aggregate { if-exceeding { bandwidth-limit <i>bandwidth</i>; burst-size-limit <i>burst</i>; } then { discard; } }</pre>
Hierarchy Level	[edit firewall hierarchical-policer]
Release Information	Statement introduced in Junos OS Release 9.5.
Description	On M40e, M120, and M320 (with FFPC and SFPC) edge routers and T320, T640, and T1600 core routers with Enhanced Intelligent Queuing (IQE) PICs, configure an aggregate hierarchical policer.
Options	Options are described separately.
Required Privilege Level	firewall—To view this statement in the configuration. firewall-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Applying Policers on page 199Junos OS Class of Service Configuration Guide

aggregate (SONET/SDH)

Syntax	<pre>aggregate asx;</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify aggregated SONET/SDH logical interface number.
Options	asx —Aggregated SONET/SDH logical interface number. Range: 0 through 15
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Aggregated SONET/SDH Interfaces

aggregate-ports

Syntax	aggregate-ports;
Hierarchy Level	[edit chassis fpc <i>slot-number</i> pic <i>pic-number</i>]
Release Information	Statement introduced in Junos OS Release 8.1.
Description	For T Series routers only, specify OC768-over-OC192 mode on the 4-port OC192C PIC. Four OC192 links are aggregated into one OC768 link with one logical interface.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Specifying OC768-over-OC192 Mode on page 103

aggregated-ether-options

```

Syntax  aggregated-ether-options {
        ethernet-switch-profile {
            ethernet-policer-profile {
                input-priority-map {
                    ieee802.1p premium [ values ];
                }
                output-priority-map {
                    classifier {
                        premium {
                            forwarding-class class-name {
                                loss-priority (high | low);
                            }
                        }
                    }
                }
            }
            policer cos-policer-name {
                aggregate {
                    bandwidth-limit bps;
                    burst-size-limit bytes;
                }
                premium {
                    bandwidth-limit bps;
                    burst-size-limit bytes;
                }
            }
        }
        (mac-learn-enable | no-mac-learn-enable);
    }
    (flow-control | no-flow-control);
    lacp {
        (active | passive);
        link-protection {
            disable;
            (revertive | non-revertive);
            periodic interval;
            system-priority priority;
        }
        link-protection;
        link-speed speed;
        logical-interface-fpc-redundancy;
        (loopback | no-loopback);
        minimum-links number;
        rebalance-periodic time hour:minute <interval hours>;
        source-address-filter {
            mac-address;
            (source-filtering | no-source-filtering);
        }
    }
}

```

Hierarchy Level [edit interfaces aex]

Release Information Statement introduced before Junos OS Release 7.4.

Description	Configure aggregated Ethernet-specific interface properties. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Ethernet Interfaces Overview

aggregated-sonet-options

Syntax	<pre>aggregated-sonet-options { link-speed <i>speed</i>; minimum-links <i>number</i>; }</pre>
Hierarchy Level	[edit interfaces <i>asx</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure aggregated SONET/SDH-specific interface properties. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Aggregated SONET/SDH Interfaces

alarm

Syntax	alarm low-light-alarm { (link-down syslog); }
Hierarchy Level	[edit interfaces <i>interface-name</i> optics-options]
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Specify the action to take if the receiving optics signal is below the optics low light alarm threshold.
Options	link-down —Drops the 10-Gigabit Ethernet link and marks link as down. syslog —Writes the optics information to the system log.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring 10-Gigabit Ethernet Link Down Notification for Optics Options Alarm or Warning

allow-any-vci

Syntax	allow-any-vci;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit 0], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit 0]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Dedicate entire ATM device to ATM cell relay circuit.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring an ATM1 Cell-Relay Circuit

allow-fragmentation

Syntax	allow-fragmentation;
Hierarchy Level	[edit interfaces <i>gr-fpc/pic/port</i> unit <i>logical-unit-number</i> tunnel], [edit logical-systems <i>logical-system-name</i> interfaces <i>gr-fpc/pic/port</i> unit <i>logical-unit-number</i> tunnel]
Release Information	Statement introduced in Junos OS Release 9.2.
Description	Enable fragmentation of generic routing encapsulation (GRE) encapsulated packets regardless of maximum transmission unit (MTU) value.
Default	By default, the GRE encapsulated packets are dropped if the packet size exceeds the MTU setting of the egress interface.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Junos OS Services Interfaces Configuration Guide • reassemble-packets on page 668

allow-remote-loopback

Syntax	allow-remote-loopback;
Hierarchy Level	[edit protocols oam link-fault-management interface <i>interface-name</i> negotiation-options]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	Enable the remote loopback on IQ2 and IQ2-E Gigabit Ethernet interfaces, and all Ethernet interfaces on the MX Series routers.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Enabling Remote Loopback Support on the Local Interface

annex

Syntax	<code>annex (annex-a annex-b);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> shdsl-options], [edit interfaces <i>interface-name</i> sonet-options aps], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> shdsl-options]
Release Information	Statement introduced in Junos OS Release 7.4.
Description	For J Series Services Routers only, configure the type of SHDSL annex. For M320 and M120 routers only, for Multiplex Section Protection (MSP) switching on SDH interfaces, set annex-b . You must also configure the working protection circuit under the [edit interfaces <i>so-fpc/pic/port</i> sonet-options aps] hierarchy level.
Default	annex-b
Options	annex-a —Use for North American SHDSL network implementations. annex-b —Use for European SHDSL network implementations.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">ATM-over-SHDSL Overview

apply-action-profile

Syntax	<code>apply-action-profile <i>profile-name</i>;</code>
Hierarchy Level	[edit protocols oam ethernet link-fault-management interface]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Apply the specified action profile to the interface for link-fault management.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Applying an Action Profile

aps

Syntax

```
aps {
  advertise-interval milliseconds;
  annex-b
  authentication-key key;
  force;
  hold-time milliseconds;
  lockout;
  neighbor address;
  paired-group group-name;
  preserve-interface;
  protect-circuit group-name;
  request;
  revert-time seconds;
  switching-mode (bidirectional | unidirectional);
  working-circuit group-name;
}
```

Hierarchy Level [edit interfaces *interface-name* sonet-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure Automatic Protection Switching (APS) on the router.

For DS3 channels on a channelized OC12 interface, configure APS on channel 0 only. If you configure APS on channels 1 through 11, it is ignored.

The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring APS and MSP

arp

Syntax	<code>arp <i>ip-address</i> (mac multicast-mac) <i>mac-address</i> <publish>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet address <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet address <i>address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	For Ethernet, Fast Ethernet, and Gigabit Ethernet interfaces only, configure Address Resolution Protocol (ARP) table entries, mapping IP addresses to MAC addresses.
Options	<p><i>ip-address</i>—IP address to map to the MAC address. The IP address specified must be part of the subnet defined in the enclosing address statement.</p> <p>mac <i>mac-address</i>—MAC address to map to the IP address. Specify the MAC address as six hexadecimal bytes in one of the following formats: <i>nnnn.nnnn.nnnn</i> or <i>nn:nn:nn:nn:nn:nn</i>. For example, 0011.2233.4455 or 00:11:22:33:44:55.</p> <p>multicast-mac <i>mac-address</i>—Multicast MAC address to map to the IP address. Specify the multicast MAC address as six hexadecimal bytes in one of the following formats: <i>nnnn.nnnn.nnnn</i> or <i>nn:nn:nn:nn:nn:nn</i>. For example, 0011.2233.4455 or 00:11:22:33:44:55.</p> <p>publish—(Optional) Have the router or switch reply to ARP requests for the specified IP address. If you omit this option, the router or switch uses the entry to reach the destination but does not reply to ARP requests.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Static ARP Table EntriesConfiguring Static ARP Entries

asynchronous-notification

Syntax	(asynchronous-notification no-asynchronous-notification);
Hierarchy Level	[edit interfaces <i>ge-fpc/pic/port</i> gigether-options]
Release Information	Statement introduced in Junos OS Release 8.3.
Description	For all 10-Gigabit Ethernet interfaces, M120, M320, and T Series routers, configure support for notification of link down alarm generation and transfer. <ul style="list-style-type: none"> • asynchronous-notification—Support notification of link down alarm generation and transfer. • no-asynchronous-notification—Prohibit notification of link down alarm generation and transfer.
Default	Support for notification of link down alarm generation and transfer is not enabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • 10-Gigabit Ethernet Notification of Link Down Alarm Overview

atm-encapsulation

Syntax	atm-encapsulation (direct plcp);
Hierarchy Level	[edit interfaces <i>at-fpc/pic/port</i> e3-options], [edit interfaces <i>at-fpc/pic/port</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure encapsulation for E3 and T3 traffic over ATM interfaces.
Default	Physical Layer Convergence Protocol (PLCP) encapsulation is the default for T3 traffic and for E3 traffic using G.751 framing.
Options	direct —Use direct encapsulation. G.832 framing on E3 interfaces requires direct encapsulation. plcp —Use PLCP encapsulation.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring E3 and T3 Parameters on ATM Interfaces • encapsulation (Physical Interface) on page 424

atm-options

```

Syntax  atm-options {
        cell-bundle-size cells;
        ilmi;
        linear-red-profiles profile-name {
            high-plp-max-threshold percent;
            low-plp-max-threshold percent;
            queue-depth cells high-plp-threshold percent low-plp-threshold percent;
        }
        mpls {
            pop-all-labels {
                required-depth number;
            }
        }
        pic-type (atm1 | atm2);
        plp-to-clp;
        promiscuous-mode {
            vpi vpi-identifier;
        }
        scheduler-maps map-name {
            forwarding-class class-name {
                epd-threshold cells plp1 cells;
                linear-red-profile profile-name;
                priority (high | low);
                transmit-weight (cells number | percent number);
            }
            vc-cos-mode (alternate | strict);
        }
        use-null-cw;
        vpi vpi-identifier {
            maximum-vcs maximum-vcs;
            oam-liveness {
                up-count cells;
                down-count cells;
            }
            oam-period (disable | seconds);
            shaping {
                (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
                length);
                queue-length number;
            }
        }
    }

```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure ATM-specific physical interface properties.

The statements are explained separately.

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Interface Encapsulations Overview on page 36• multipoint-destination on page 582• shaping on page 703• vci on page 785

atm-scheduler-map

Syntax	atm-scheduler-map (<i>map-name</i> default);
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Associate a scheduler map with a virtual circuit on a logical interface.
Options	<i>map-name</i> —Name of scheduler map that you define at the [edit interfaces <i>interface-name</i> atm-options scheduler-maps] hierarchy level. default —The default scheduler mapping.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring ATM2 IQ VC Tunnel CoS Components• scheduler-maps on page 689

authentication

Syntax	<pre>authentication { password <i>password-string</i>; username-include { circuit-type; delimiter <i>delimiter-character</i>; domain-name <i>domain-name-string</i>; interface-name; mac-address; option-82; radius-realm <i>radius-realm-string</i>; user-prefix <i>user-prefix-string</i>; } }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> auto-configure <i>vlan-ranges</i>], [edit interfaces <i>interface-name</i> auto-configure <i>stacked-vlan-ranges</i>]
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Specify the authentication parameters that trigger the Access-Request message to AAA for the interface.
Options	The remaining statements are explained separately.
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Subscribers over Static InterfacesConfiguring the Static Subscriber Global Authentication Password

authentication-key

Syntax	<code>authentication-key key;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the Automatic Protection Switching (APS) authentication key (password).
Options	key —Authentication password. It can be 1 through 8 characters long. Configure the same key for both the working and protect routers.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Basic APS Support For information about the authentication-key statement at the [edit interfaces <i>interface-name</i> unit <i>unit-number</i> family inet address <i>address</i> (vrrp-group vrrp-inet6-group) <i>group-number</i>] or [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>unit-number</i> family (inet inet6) address <i>address</i> (vrrp-group vrrp-inet6-group) <i>group-number</i>] hierarchy level, see the <i>Junos OS High Availability Configuration Guide</i>.

authentication-profile-name

Syntax	<code>authentication-profile-name access-profile-name;</code>
Hierarchy Level	[edit protocols dot1x authenticator]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Specify the RADIUS authentication profile to use for user authentication when establishing an IEEE 802.1x Port-Based Network Access Control (dot1x) connection.
Required Privilege Level	interface—To view this statement in the configuration. interface control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> IEEE 802.1x Port-Based Network Access Control Overview authenticator on page 326 dot1x on page 405

authenticator

Syntax authenticator {
 authentication-profile-name *access-profile-name*;
 interface *interface-id* {
 maximum-requests *integer*;
 quiet-period *seconds*;
 reauthentication (disable | interval *seconds*);
 retries *integer*;
 server-timeout *seconds*;
 supplicant (*single*);
 supplicant-timeout *seconds*;
 transmit-period *seconds*;
 }
 }

Hierarchy Level [edit protocols dot1x]

Release Information Statement introduced in Junos OS Release 9.3.

Description Specify an authentication profile for user or client authentication and configure the Ethernet interface for 802.1x protocol operation.

Options **authentication-profile-name *access-profile-name***—Specifies the RADIUS authentication profile for user or client authentication.

The remaining statements are explained separately.

Required Privilege Level protocols—To view this statement in the configuration.
 protocols-control—To add this statement to the configuration.

Related Documentation

- IEEE 802.1x Port-Based Network Access Control Overview
- **authentication-profile-name** on page 325
- **dot1x** on page 405

auto-configure

```
Syntax auto-configure {
    vlan-ranges {
        access-profile profile-name;
        authentication {
            password password-string;
            username-include {
                circuit-type;
                delimiter delimiter-character;
                domain-name domain-name-string;
                interface-name;
                mac-address;
                option-82;
                radius-realm radius-realm-string;
                user-prefix user-prefix-string;
            }
        }
        dynamic-profile profile-name {
            accept (any | dhcp-v4 | dhcp-v6 | inet | inet6 | pppoe);
            ranges (any | low-tag)–(any | high-tag);
        }
        override;
    }
    stacked-vlan-ranges {
        access-profile profile-name;
        authentication {
            password password-string;
            username-include {
                circuit-type;
                delimiter delimiter-character;
                domain-name domain-name-string;
                interface-name;
                mac-address;
                option-82;
                radius-realm radius-realm-string;
                user-prefix user-prefix-string;
            }
        }
        dynamic-profile profile-name {
            accept (any | dhcp-v4 | dhcp-v6 | inet | inet6 | pppoe);
            ranges (any | low-tag–high-tag), (any | low-tag–high-tag);
        }
        override;
    }
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Enables the configuration of dynamic, auto-sensed VLANs.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring VLAN Interfaces to Use Dynamic Profiles

auto-discovery

Syntax auto-discovery;

Hierarchy Level [edit protocols oam ethernet connectivity-fault-management maintenance-domain
domain-name maintenance-association *ma-name* mep *mep-id*]

Release Information Statement introduced in Junos OS Release 8.4.

Description Enable the MEP to accept continuity check messages from all remote MEPs.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring a Maintenance Endpoint
- Example: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers

auto-negotiation

Syntax	(auto-negotiation no-auto-negotiation) remote-fault <local-interface-online local-interface-offline>;
Hierarchy Level	[edit interfaces <i>interface-name</i> ether-options], [edit interfaces <i>interface-name</i> gigether-options], [edit interfaces <i>ge-pim</i> /0/0 switch-options switch-port <i>port-number</i>]
Release Information	Statement introduced in Junos OS Release 7.6. Statement introduced in Junos OS Release 8.4 for J Series Services Routers. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	<p>For Gigabit Ethernet interfaces on M Series, MX Series, T Series, and TX Matrix routers, explicitly enable autonegotiation and remote fault. For EX Series switches and J Series Services Routers, explicitly enable autonegotiation only.</p> <ul style="list-style-type: none"> • auto-negotiation—Enables autonegotiation. This is the default. • no-auto-negotiation—Disable autonegotiation. When autonegotiation is disabled, you must explicitly configure the link mode and speed. <p>When you configure Tri-Rate Ethernet copper interfaces to operate at 1 Gbps, autonegotiation must be enabled.</p> <p>On J Series Services Routers with universal Physical Interface Modules (uPIMs), if the link speed and duplex mode are also configured, the interfaces use the values configured as the desired values in the negotiation. If autonegotiation is disabled, the link speed and link mode must be configured.</p>
Default	Autonegotiation is automatically enabled. No explicit action is taken after the autonegotiation is complete or if the negotiation fails.
Options	<p>remote-fault (local-interface-online local-interface-offline)—(Optional) For M Series, MX Series, T Series, and TX matrixrouters only, manually configure remote fault on an interface.</p> <p>Default: local-interface-online</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Gigabit Ethernet Autonegotiation Overview • Configuring J Series Services Router Switching Interfaces • Configuring Gigabit Ethernet Interfaces (CLI Procedure) • Configuring Gigabit Ethernet Interfaces (CLI Procedure)

auto-reconnect

Syntax	<code>auto-reconnect seconds;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> pppoe-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> pppoe-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For J Series Services Routers with PPP over Ethernet interfaces, configure the amount of time to wait before reconnecting after a session has terminated.
Options	seconds —Time to wait before reconnecting after a session has terminated. Range: 0 through 4,294,967,295 seconds Default: 0 (immediately)
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the PPPoE Automatic Reconnect Wait Timer<i>Junos OS Interfaces and Routing Configuration Guide</i>

backup-destination

Syntax	<code>backup-destination address;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For tunnel interfaces, specify the remote address of the backup tunnel.
Options	address —Address of the remote side of the connection.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"><i>Junos OS Services Interfaces Configuration Guide</i>destination (Tunnels) on page 394

backup-interface

Syntax	<code>backup-interface es-fpc/pic/port;</code>
Hierarchy Level	<code>[edit interfaces es-fpc/pic/port es-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure a backup ES Physical Interface Card (PIC). If the primary ES PIC fails, the backup becomes active, inherits all the tunnels and security associations (SAs), and acts as the new next hop for IP Security (IPsec) traffic.
Options	<code>es-fpc/pic/port</code> —Name of ES interface to serve as the backup.
Required Privilege Level	<code>interface</code> —To view this statement in the configuration. <code>interface-control</code> —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Junos OS Services Interfaces Configuration Guide

backup-options

Syntax	<pre>backup-options { interface <i>interface-name</i>; }</pre>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure an interface to be used as a backup interface if the primary interface goes down. This is used to support ISDN dial backup operation.</p> <p>The remaining statement is explained separately.</p>
Required Privilege Level	<code>interface</code> —To view this statement in the configuration. <code>interface-control</code> —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring an ISDN Dialer Interface as a Backup Interface • Junos OS Interfaces and Routing Configuration Guide

bandwidth

Syntax	<code>bandwidth rate;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure an informational-only bandwidth value for an interface. This statement is valid for all logical interface types except multilink and aggregated interfaces.



NOTE: We recommend that you be careful when setting this value. Any interface bandwidth value that you configure using the `bandwidth` statement affects how the interface cost is calculated for a dynamic routing protocol, such as OSPF. By default, the interface cost for a dynamic routing protocol is calculated using the following formula:

$$\text{cost} = \text{reference-bandwidth} / \text{bandwidth},$$

where bandwidth is the physical interface speed. However, if you specify a value for bandwidth using the `bandwidth` statement, that value is used to calculate the interface cost, rather than the actual physical interface bandwidth.

Options	rate —Peak rate, in bits per second (bps) or cells per second (cps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000). You can also specify a value in cells per second by entering a decimal number followed by the abbreviation c ; values expressed in cells per second are converted to bits per second by means of the formula 1 cps = 384 bps. Range: Not limited.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the Interface Bandwidth on page 166

bandwidth-limit

See the following sections:

- **bandwidth-limit (Hierarchical Policer)** on page 333
- **bandwidth-limit (Policer for Gigabit Ethernet Interfaces)** on page 334

bandwidth-limit (Hierarchical Policer)

Syntax	<code>bandwidth-limit <i>bandwidth</i>;</code>
Hierarchy Level	[edit firewall hierarchical-policer aggregate if-exceeding], [edit firewall hierarchical-policer premium if-exceeding]
Release Information	Statement introduced in Junos OS Release 9.5.
Description	For M40e, M120, and M320 (with FFPC and SFPC) edge routers and T320, T640, and T1600 core routers with Enhanced Intelligent Queuing (IQE) PICs, to define a policer to apply to nonpremium traffic in a hierarchical policer.
Required Privilege Level	firewall—To view this statement in the configuration. firewall-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Applying Policers on page 199• Junos OS Class of Service Configuration Guide

bandwidth-limit (Policer for Gigabit Ethernet Interfaces)

Syntax	<code>bandwidth-limit <i>bps</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile ethernet-policer-profile policer <i>cos-policer-name</i> aggregate], [edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile ethernet-policer-profile policer <i>cos-policer-name</i> premium]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Define a policer to apply to nonpremium traffic.
Options	<i>bps</i> —Bandwidth limit, in bits per second. Specify either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000). Range: 32 Kbps through 32 gigabits per second (Gbps). For IQ2 and IQ2-E interfaces 65,536 bps through 1 Gbps. For 10-Gigabit IQ2 and IQ2-E interfaces 65,536 bps through 10 Gbps.
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Gigabit Ethernet Policersburst-size-limit (Policer for Gigabit Ethernet Interfaces) on page 345

bchannel-allocation

Syntax	<code>bchannel-allocation (ascending descending);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> isdn-options]
Release Information	Statement introduced in Junos OS Release 8.3.
Description	(J Series Services Routers equipped with a Dual-Port Channelized T1/E1 PIM) For Integrated Services Digital Network Primary Rate Interfaces (ISDN PRI), allocate PRI dialout B-channels in ascending or descending order.
Options	(ascending descending) —Allocate the B-channels in ascending (from low to high) or descending (from high to low) order. Default: Descending order
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Allocating B-Channels for Dialout<i>Junos OS Interfaces and Routing Configuration Guide</i>

bearer-bandwidth-limit

Syntax	<code>bearer-bandwidth-limit <i>kilobits-per-second</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> dynamic-call-admission-control], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> dynamic-call-admission-control]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	(J4350 and J6350 Services Routers supporting voice over IP with the TGM550 media gateway module) For Fast Ethernet and Gigabit Ethernet interfaces, ISDN BRI interfaces, and serial interfaces with PPP or Frame Relay encapsulation, configure the bearer bandwidth limit (BBL). BBL is used for dynamic call admission control (dynamic CAC) to provide enhanced control over WAN bandwidth.
Options	<p><i>kilobits-per-second</i>—The bearer bandwidth limit to be reported to a TGM550 media gateway module, in kilobits per second (kbps).</p> <p>Range: 0 through 9999 kbps</p> <p>Default: 1 (dynamic CAC is not enabled on the interface)</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Dynamic Call Admission Control on page 174 Junos OS Services Interfaces Configuration Guide Junos OS Interfaces and Routing Configuration Guide

bert-algorithm

Syntax `bert-algorithm algorithm;`

Hierarchy Level `[edit interfaces ce1-fpc/pic/port],`
`[edit interfaces ct1-fpc/pic/port],`
`[edit interfaces interface-name ds0-options],`
`[edit interfaces interface-name e1-options],`
`[edit interfaces interface-name e3-options],`
`[edit interfaces interface-name t1-options],`
`[edit interfaces interface-name t3-options]`

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure the pattern to send in the bit stream during a bit error rate test (BERT). Applies to T1, E3, T3, and multichannel DS3 interfaces, the channelized interfaces (DS3, OC12, STM1), and channelized IQ and IQE interfaces (E1, E3 and DS3).



NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the `bert-algorithm` statement must be included at the `[edit interfaces ce1-fpc/pic/port]` or `[edit interfaces ct1-fpc/pic/port]` hierarchy level as appropriate.

Options `algorithm`—Pattern to send in the bit stream. There are two categories of test patterns: pseudorandom and repetitive. Both patterns conform to CCITT/ITU O.151, O.152, O.153, and O.161 standards. The algorithm can be one of the following patterns:

- **all-ones-repeating**—Pattern is all ones.
- **all-zeros-repeating**—Pattern is all zeros.
- **alternating-double-ones-zeros**—Pattern is alternating pairs of ones and zeros.
- **alternating-ones-zeros**—Pattern is alternating ones and zeros.
- **pseudo-2e3**—Pattern is $2^3 - 1$.
- **pseudo-2e4**—Pattern is $2^4 - 1$.
- **pseudo-2e5**—Pattern is $2^5 - 1$.
- **pseudo-2e6**—Pattern is $2^6 - 1$.
- **pseudo-2e7**—Pattern is $2^7 - 1$.
- **pseudo-2e9-o153**—Pattern is $2^9 - 1$, as defined in the O153 standard.
- **pseudo-2e10**—Pattern is $2^{10} - 1$.
- **pseudo-2e11-o152**—Pattern is $2^{11} - 1$, as defined in the O152 standard.
- **pseudo-2e15-o151**—Pattern is $2^{15} - 1$, as defined in the O151 standard.

- **pseudo-2e17**—Pattern is $2^{17} - 1$.
- **pseudo-2e18**—Pattern is $2^{18} - 1$.
- **pseudo-2e20-o151**—Pattern is $2^{20} - 1$, as defined in the O151 standard.
- **pseudo-2e20-o153**—Pattern is $2^{20} - 1$, as defined in the O153 standard.
- **pseudo-2e21**—Pattern is $2^{21} - 1$.
- **pseudo-2e22**—Pattern is $2^{22} - 1$.
- **pseudo-2e23-o151**—Pattern is $2^{23} - 1$, as defined in the O151 standard.
- **pseudo-2e25**—Pattern is $2^{25} - 1$.
- **pseudo-2e28**—Pattern is $2^{28} - 1$.
- **pseudo-2e29**—Pattern is $2^{29} - 1$.
- **pseudo-2e31**—Pattern is $2^{31} - 1$.
- **pseudo-2e32**—Pattern is $2^{32} - 1$.
- **repeating-1-in-4**—One bit in four is set to 1; the others are set to 0.
- **repeating-1-in-8**—One bit in eight is set to 1; the others are set to 0.
- **repeating-3-in-24**—Three bits in twenty four are set to 1; the others are set to 0.

Default: pseudo-2e3

Required Privilege interface—To view this statement in the configuration.
Level interface-control—To add this statement to the configuration.

Related Documentation

- Interface Diagnostics on page 143
- Configuring E1 BERT Properties
- Configuring E3 BERT Properties
- Configuring T1 BERT Properties
- Configuring T3 BERT Properties
- Examples: Configuring T3 Interfaces
- **bert-error-rate on page 338**
- **bert-period on page 339**

bert-error-rate


Syntax	<code>bert-error-rate rate;</code>
Hierarchy Level	[edit interfaces <i>ce1-fpc/pic/port</i>], [edit interfaces <i>ct1-fpc/pic/port</i>], [edit interfaces <i>interface-name ds0-options</i>], [edit interfaces <i>interface-name e1-options</i>], [edit interfaces <i>interface-name e3-options</i>], [edit interfaces <i>interface-name t1-options</i>], [edit interfaces <i>interface-name t3-options</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the bit error rate to use in a BERT procedure. Applies to E1, E3, T1, or T3 interfaces, and to the channelized interfaces (DS3, OC3, OC12, and STM1).



NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the `bert-error-rate` statement must be included at the [edit interfaces *ce1-fpc/pic/port*] or [edit interfaces *ct1-fpc/pic/port*] hierarchy level as appropriate.

Options	rate —Bit error rate. Range: 0 through 7, which corresponds to 10^{-1} (1 error per bit) to 10^{-7} (1 error per 10 million bits) Default: 0
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Interface Diagnostics on page 143• Configuring E1 BERT Properties• Configuring E3 BERT Properties• Configuring T1 BERT Properties• Configuring T3 BERT Properties• Examples: Configuring T3 Interfaces• bert-algorithm on page 336• bert-period on page 339

bert-period

Syntax	<code>bert-period <i>seconds</i>;</code>
Hierarchy Level	<code>[edit interfaces <i>ce1-fpc/pic/port</i>],</code> <code>[edit interfaces <i>ct1-fpc/pic/port</i>],</code> <code>[edit interfaces <i>interface-name</i> <i>ds0-options</i>],</code> <code>[edit interfaces <i>interface-name</i> <i>e1-options</i>],</code> <code>[edit interfaces <i>interface-name</i> <i>e3-options</i>],</code> <code>[edit interfaces <i>interface-name</i> <i>t1-options</i>],</code> <code>[edit interfaces <i>interface-name</i> <i>t3-options</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure the duration of a BERT test. Applies to E1, E3, T1, and T3 interfaces, and to E1, E3, T1, and T3 partitions on the channelized interfaces (CE1, CT1, DS3, OC3, OC12, OC48, STM1, STM4, and STM16).</p> <p>E1 and T1 IQ, IQE, and standard interfaces support an extended BERT period range, up to 86,400 seconds (24 hours).</p>
	<div>  <p>NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the <code>bert-period</code> statement must be included at the <code>[edit interfaces <i>ce1-fpc/pic/port</i>]</code> or <code>[edit interfaces <i>ct1-fpc/pic/port</i>]</code> hierarchy level as appropriate.</p> </div>
Options	<p><i>seconds</i>—Test duration. Range and default values vary by interface type.</p> <p>Range:</p> <ul style="list-style-type: none"> PIC-dependent—Normal BERT period: either 1 through 239 seconds or 1 through 240 seconds PIC-dependent—Extended BERT period: from 1 through 86,400 seconds <p>Default:</p> <ul style="list-style-type: none"> Normal BERT period: 10 seconds Extended BERT period (on supported E1 interfaces): 10 seconds Extended BERT period (on supported T1 interfaces): 240 seconds
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Interface Diagnostics on page 143 Configuring E1 BERT Properties Configuring E3 BERT Properties

- Configuring T1 BERT Properties
- Configuring T3 BERT Properties
- **bert-algorithm** on page 336
- **bert-error-rate** on page 338

bridge-domain

Syntax	<code>bridge-domain <i>name</i>;</code> <code> vlan-id [<i>vlan-identifiers</i>];</code> <code>}</code>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>maintenance-domain-name</i>], [edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>maintenance-domain-name</i> virtual-switch <i>virtual-switch-name</i>]
Release Information	Statement introduced in Junos OS Release 9.4.
Description	(MX Series routers only) Specify the OAM Ethernet CFM maintenance domain bridge domain.
Options	<i>name</i> —Specify the name of the bridge domain. <i>vlan-identifiers</i> —Specify one or more VLAN identifiers.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Maintenance Intermediate Points• Example: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers• maintenance-domain on page 561

broadcast

Syntax	<code>broadcast address;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	Set the broadcast address on the network or subnet. On a subnet you cannot specify a host address of 0, nor can you specify a broadcast address.
Default	The default broadcast address has a host portion of all ones.
Options	address —Broadcast address. The address must have a host portion of either all ones or all zeros. You cannot specify the addresses 0.0.0.0 or 255.255.255.255 .
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring the Interface Address on page 182

buildout


See the following sections:

- **buildout (E3 or T3 over ATM Interfaces)** on page 342
- **buildout (T1 Interfaces)** on page 343

buildout (E3 or T3 over ATM Interfaces)

Syntax	<code>buildout <i>feet</i>;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> e3-options], [edit interfaces at- <i>fpc/pic/port</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For E3 and T3 traffic over ATM interfaces, set the buildout value.
Options	<i>feet</i> —The buildout value in feet. Range: 0 through 450 feet (137 meters) Default: 10 feet (3 meters)
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring E3 and T3 Parameters on ATM Interfaces

buildout (T1 Interfaces)

Syntax	<code>buildout value;</code>
Hierarchy Level	[edit interfaces <i>ct1-fpc/pic/port</i>] [edit interfaces <i>interface-name</i> t1-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For T1 interfaces, set the buildout value.
<div>  <p>NOTE: When configuring CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the buildout statement must be included at the hierarchy level.</p> </div>	
Default	The default buildout value is 0 through 132 feet.
Options	<p>You can set the buildout value to one of the following:</p> <ul style="list-style-type: none"> • 0-132—0 through 132 feet (0 through 40 meters) • 133-265—133 through 265 feet (40 through 81 meters) • 266-398—266 through 398 feet (81 through 121 meters) • 399-531—399 through 531 feet (121 through 162 meters) • 532-655—532 through 655 feet (162 through 200 meters) • long-0db—For J Series routers only, long buildout with 0 decibel (dB) transmit attenuation • long-7.5db—For J Series routers only, long buildout with 7.5 dB transmit attenuation • long-15db—For J Series routers only, long buildout with 15 dB transmit attenuation • long-22.5db—For J Series routers only, long buildout with 22.5 dB transmit attenuation
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring the T1 Buildout • <i>Junos OS Interfaces and Routing Configuration Guide</i>

bundle

Syntax	<code>bundle (ml-<i>fpc/pic/port</i> ls-<i>fpc/pic/port</i>);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Associate the multilink interface with the logical interface it is joining. You can include this statement for the mlfr-end-to-end and mlfr-uni-nni protocol families only.



NOTE:

For M Series routers and T Series routers, the following caveats apply:

- Maximum supported throughput on the bundle interfaces is 45 Mbps.
 - Bundling of the logical interfaces under a T3 physical interface into the same or different bundles is not supported.
-

Options	ml-<i>fpc/pic/port</i> —Name of the multilink interface you are linking. ls-<i>fpc/pic/port</i> —Name of the link services interface you are linking.
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

burst-size-limit

See the following sections:

- **burst-size-limit (Hierarchical Policer)** on page 345
- **burst-size-limit (Policer for Gigabit Ethernet Interfaces)** on page 345

burst-size-limit (Hierarchical Policer)

Syntax	<code>burst-size-limit <i>burst</i>;</code>
Hierarchy Level	[edit firewall hierarchical-policer aggregate if-exceeding], [edit firewall hierarchical-policer premium if-exceeding]
Release Information	Statement introduced in Junos OS Release 9.5.
Description	For M40e, M120, and M320 (with FFPC and SFPC) edge routers and T320, T640, and T1600 core routers with Enhanced Intelligent Queuing (IQE) PICs, define a policer burst size limit to apply to nonpremium traffic in a hierarchical policer.
Required Privilege Level	firewall—To view this statement in the configuration. firewall-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Applying Policers on page 199 • <i>Junos OS Class of Service Configuration Guide</i>

burst-size-limit (Policer for Gigabit Ethernet Interfaces)

Syntax	<code>burst-size-limit <i>bytes</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile ethernet-policer-profile policer <i>cos-policer-name</i> aggregate], [edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile ethernet-policer-profile policer <i>cos-policer-name</i> premium]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Define a policer to apply to nonpremium traffic.
Options	<i>bytes</i> —Burst length. Range: 1500 through 100,000,000 bytes
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Gigabit Ethernet Policers • bandwidth-limit (Policer for Gigabit Ethernet Interfaces) on page 334

byte-encoding

Syntax	byte-encoding (nx56 nx64);
Hierarchy Level	[edit interfaces <i>t1-fpc/pic/port</i>], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> t1-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Set the byte encoding on a DS0 or T1 interface to use 7 bits per byte or 8 bits per byte.



NOTE: When configuring T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the **byte-encoding** statement must be included at the [edit interfaces *t1-fpc/pic/port*] hierarchy level.

Default	The default byte encoding is 8 bits per byte (nx64).
Options	nx56 —Use 7 bits per byte. nx64 —Use 8 bits per byte.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring T1 Byte Encoding

bytes

Syntax	<pre>bytes { c2 <i>value</i>; e1-quiet <i>value</i>; f1 <i>value</i>; f2 <i>value</i>; s1 <i>value</i>; z3 <i>value</i>; z4 <i>value</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Set values in some SONET/SDH header bytes.
Options	<p>c2 <i>value</i>—Path signal label SONET/SDH overhead byte. SONET/SDH frames use the C2 byte to indicate the contents of the payload inside the frame. SONET/SDH interfaces use the C2 byte to indicate whether the payload is scrambled.</p> <p>Range: 0 through 255</p> <p>Default: 0xCF</p> <p>e1-quiet <i>value</i>—Default idle byte sent on the orderwire SONET/SDH overhead bytes. The router does not support the orderwire channel, and hence sends this byte continuously.</p> <p>Range: 0 through 255</p> <p>Default: 0x7F</p> <p>f1 <i>value</i>, f2 <i>value</i>, z3 <i>value</i>, z4 <i>value</i>—SONET/SDH overhead bytes.</p> <p>Range: 0 through 255</p> <p>Default: 0x00</p> <p>s1 <i>value</i>—Synchronization message SONET overhead byte. This byte is normally controlled as a side effect of the system reference clock configuration and the state of the external clock coming from an interface if the system reference clocks have been configured to use an external reference.</p> <p>Range: 0 through 255</p> <p>Default: 0xCC</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring SONET/SDH Header Byte Values no-concatenate

calculation-weight

Syntax	<pre>calculation-weight { delay <i>delay-value</i>; delay-variation <i>delay-variation-value</i>; }</pre>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management performance-monitoring sla-iterator-profiles <i>profile-name</i>]
Release Information	Statement introduced in Junos OS Release 11.1.
Description	Configure the calculation weight for delay and delay variation.




NOTE: This option is applicable only for two-way delay measurement.

The remaining statements are explained separately.

Required Privilege Level	Configure—To enter configuration mode. Control—To modify any configuration.
---------------------------------	--

Related Documentation	<ul style="list-style-type: none">• Configuring an Iterator Profile• delay on page 384• delay-variation on page 385
------------------------------	---

callback

Syntax	callback;
Hierarchy Level	[edit interfaces <i>dl n</i> unit <i>logical-unit-number</i> dialer-options incoming-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>dl n</i> unit <i>logical-unit-number</i> dialer-options incoming-map]
Release Information	Statement introduced in Junos OS Release 7.5.
Description	On J Series Services Routers with interfaces configured for ISDN, configure the dialer to terminate the incoming call and call back the originator after the callback wait period. The default wait time is 5 seconds. To configure the wait time, include the callback-wait-period statement at the [edit interfaces <i>dl n</i> unit <i>logical-unit-number</i> dialer-options] hierarchy level.
<div>  <p>NOTE: The incoming-map statement is mandatory for the router to accept any incoming ISDN calls.</p> </div>	
<p>If the callback statement is configured, you cannot use the caller caller-id statement at the [edit interfaces <i>dl n</i> unit <i>logical-unit-number</i> dialer-options] hierarchy level.</p>	
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Dial-In and Callback <i>Junos OS Interfaces and Routing Configuration Guide</i> callback-wait-period on page 350

callback-wait-period

Syntax	<code>callback-wait-period <i>time</i>;</code>
Hierarchy Level	[edit interfaces <i>dl</i> n unit <i>logical-unit-number</i> dialer-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>dl</i> n unit <i>logical-unit-number</i> dialer-options]
Release Information	Statement introduced in Junos OS Release 7.5.
Description	<p>On J Series Services Routers with interfaces configured for ISDN with callback, specify the amount of time the dialer waits before calling back the caller. The default wait time is 5 seconds. The wait time is necessary because, when a call is rejected, the switch waits for up to 4 seconds on point-to-multipoint connections to ensure no other device accepts the call before sending the DISCONNECT message to the originator of the call. However, the default time of 5 seconds may not be sufficient for different switches or may not be needed on point-to-point connections.</p> <p>To configure callback mode, include the callback statement at the [edit interfaces <i>dl</i>n unit <i>logical-unit-number</i> dialer-options] hierarchy level.</p> <p>If the callback statement is configured, you cannot use the caller <i>caller-id</i> statement at the [edit interfaces <i>dl</i>n unit <i>logical-unit-number</i> dialer-options] hierarchy level.</p>
Options	<i>time</i> —Time the dialer waits before calling back the caller.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Dial-In and Callback<i>Junos OS Interfaces and Routing Configuration Guide</i>

caller

Syntax	<code>caller (caller-id accept-all);</code>
Hierarchy Level	[edit interfaces <i>dl</i> n unit <i>logical-unit-number</i> dialer-options incoming-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>dl</i> n unit <i>logical-unit-number</i> dialer-options incoming-map]
Release Information	Statement introduced in Junos OS Release 7.5.
Description	On J Series Services Routers with interfaces configured for ISDN, specify the dialer to accept a specified caller number or accept all incoming calls.
Options	<p>caller-id—Incoming caller number. You can configure multiple caller IDs on a dialer. The caller ID of the incoming call is matched against all caller IDs configured on all dialers. The dialer matching the caller ID is looked at for further processing. Only a precise match is a valid match. For example, the configured caller ID 1-222-333-4444 or 222-333-4444 will match the incoming caller ID 1-222-333-4444.</p> <p>If the incoming caller ID has fewer digits than the number configured, it is not a valid match. Duplicate caller IDs are not allowed on different dialers; however, for example, the numbers 1-408-532-1091, 408-532-1091, and 532-1091 can still be configured on different dialers.</p> <p>Only one B-channel can map to one dialer. If one dialer is already mapped, any other call mapping to the same dialer is rejected (except in the case of a multilink dialer). If no dialer caller is configured on a dialer, that dialer will not accept any calls.</p> <p>accept-all—Any incoming call in an associated interface is accepted.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> ISDN Interfaces Overview <i>Junos OS Interfaces and Routing Configuration Guide</i>

calling-number

Syntax	<code>calling-number <i>number</i>;</code>
Hierarchy Level	[edit interfaces <i>br-pim</i> /0/ <i>port</i> isdn-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	On J Series Services Routers with ISDN interfaces, configure the calling number to include in outgoing calls.
Options	<i>number</i> —Calling number.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ISDN Physical Interface Properties<i>Junos OS Interfaces and Routing Configuration Guide</i>

cbit-parity

Syntax	<code>(cbit-parity no-cbit-parity);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For T3 interfaces only, enable or disable C-bit parity mode, which controls the type of framing that is present on the transmitted T3 signal. When C-bit parity mode is enabled, the C-bit positions are used for the far-end block error (FEBE), far-end alarm and control (FEAC), terminal data link, path parity, and mode indicator bits, as defined in ANSI T1.107a-1989. For ATM and ATM2 IQ2 and IQ2-E interfaces, M23 framing is used when the no-cbit-parity statement is included. For all other interfaces, M13 framing is used when the no-cbit-parity statement is included.
Default	C-bit parity mode is enabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring E3 and T3 Parameters on ATM InterfacesDisabling T3 C-Bit Parity Mode

cbr

Syntax	<code>cbr rate;</code>
Hierarchy Level	<p>[edit interfaces at-<i>fpc/pic/port</i> atm-options vpi <i>vpi-identifier</i> shaping],</p> <p>[edit interfaces at-<i>fpc/pic/port</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping],</p> <p>[edit interfaces at-<i>fpc/pic/ port</i> unit <i>logical-unit-number</i> shaping],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces at-<i>fpc/pic/port</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces at-<i>fpc/pic/port</i> unit <i>logical-unit-number</i> shaping]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p>
Description	For ATM encapsulation only, define a constant bit rate bandwidth utilization in the traffic-shaping profile.
Default	Unspecified bit rate (UBR); that is, bandwidth utilization is unlimited.
Options	<p>rate—Peak rate, in bits per second (bps) or cells per second (cps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000). You can also specify a value in cells per second by entering a decimal number followed by the abbreviation c; values expressed in cells per second are converted to bits per second by means of the formula 1 cps = 384 bps.</p> <p>For ATM1 and ATM2 OC3 interfaces, the maximum available rate is 100 percent of <i>line-rate</i>, or 135,600,000 bps. For ATM1 OC12 interfaces, the maximum available rate is 50 percent of <i>line-rate</i>, or 271,263,396 bps. For ATM2 IQ interfaces, the maximum available rate is 542,526,792 bps.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Defining the ATM Traffic-Shaping Profile rtvbr on page 686 shaping on page 703 vbr on page 783

cell-bundle-size

Syntax	<code>cell-bundle-size <i>cells</i>;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options], [edit interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces using ATM Layer 2 circuit cell-relay transport mode only, you can configure the maximum number of ATM cells per frame.
Options	<i>cells</i> —Maximum number of cells. Default: 1 cell Range: 1 through 176 cells
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the Layer 2 Circuit Cell-Relay Cell Maximum

chap

Syntax	<pre> chap { access-profile <i>name</i>; default-chap-secret <i>name</i>; local-name <i>name</i>; passive; } </pre>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> ppp-options], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options]</p>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Allows each side of a link to challenge its peer, using a “secret” known only to the authenticator and that peer. The secret is not sent over the link.</p> <p>By default, PPP CHAP is disabled. If CHAP is not explicitly enabled, the interface makes no CHAP challenges and denies all incoming CHAP challenges.</p> <p>For ATM2 IQ interfaces only, you can configure CHAP on the logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:</p> <ul style="list-style-type: none"> • atm-ppp-llc—PPP over AAL5 LLC encapsulation. • atm-ppp-vc-mux—PPP over AAL5 multiplex encapsulation. <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring the PPP Challenge Handshake Authentication Protocol on page 121 • Junos OS System Basics Configuration Guide

chap-secret

Syntax	<code>chap-secret <i>chap-secret</i>;</code>
Hierarchy Level	[edit access profile <i>profile-name</i> client <i>client-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For interfaces with PPP encapsulation on which the PPP Challenge Handshake Authentication Protocol (CHAP) is configured, configure the shared secret, as defined in RFC 1994.
Options	<i>chap-secret</i> —The secret key associated with a peer.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring PPP CHAP Authentication on page 171pap-password on page 617Junos OS System Basics Configuration Guide

circuit-type

Syntax	<code>circuit-type;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> auto-configure vlan-ranges authentication username-include], [edit interfaces <i>interface-name</i> auto-configure stacked-vlan-ranges authentication username-include],
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Specify that the circuit type is concatenated with the username during the subscriber authentication process.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring VLAN Interface Username Information for AAA Authentication

cisco-interoperability

Syntax	<code>cisco-interoperability send-lip-remove-link-for-link-reject;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options]
Release Information	Statement introduced in Junos OS Release 7.4.
Description	FRF.16 interoperability settings.
Options	send-lip-remove-link-for-link-reject —Send Link Integrity Protocol remove link when an add-link rejection message is received.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Junos OS Services Interfaces Configuration Guide

classifier

Syntax	<pre> classifier { per-unit-scheduler { forwarding-class <i>class-name</i> { loss-priority (high low); } } } </pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile ethernet-policer-profile output-priority-map]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For Gigabit Ethernet IQ and 10-Gigabit Ethernet interfaces only, define the classifier for the output priority map to be applied to outgoing frames on this interface.</p> <p>The statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Specifying an Output Priority Map • input-priority-map on page 491

clear-dont-fragment-bit

Syntax	clear-dont-fragment-bit;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Clear the don't-fragment (DF) bit on all IP version 4 (IPv4) packets entering a generic routing encapsulation (GRE) tunnel. If the encapsulated packet's size exceeds the tunnel's maximum transmission unit (MTU), the packet is fragmented before encapsulation. The statement is supported only on MX Series routers and all M Series routers except the M320 router.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

client

Syntax	client;
Hierarchy Level	[edit interfaces pp0 unit <i>logical-unit-number</i> pppoe-options], [edit logical-systems <i>logical-system-name</i> interfaces pp0 unit <i>logical-unit-number</i> pppoe-options]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	On J Series Services Routers, configure the router to operate in the PPPoE client mode.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the PPPoE Client Mode

clock-rate

Syntax	<code>clock-rate rate;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For EIA-530 and V.35 interfaces, configure the interface speed, in megahertz (MHz).
Options	<p>rate—You can specify one of the following rates:</p> <ul style="list-style-type: none">• 2.048 MHz• 2.341 MHz• 2.731 MHz• 3.277 MHz• 4.096 MHz• 5.461 MHz• 8.192 MHz• 16.384 MHz <p>Default: 16.384 MHz</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring the Serial Clocking Mode on page 279



clocking

Syntax	clocking (external [interface <i>interface-name</i>] internal);
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. interface option added in Junos OS Release 8.2.
Description	For interfaces that can use various clock sources, configure the source of the transmit clock on each interface.
Options	<p>external—The clock source is provided by the data communication equipment (DCE).</p> <p>interface <i>interface-name</i>—For interfaces operating on T1/E1 PIMs for J Series Services Routers only, configure clocking for the drop-and insert feature. When configuring this feature, both ports must use the same clock source: either the router's internal clock or an external clock on one of the interfaces. If an external clock source is required, one interface must specify clocking external and the other must specify the same clock.</p> <p>internal—Use the internal stratum 3 clock as the reference clock.</p> <p>Default: internal</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Clock Source on page 137• Configuring the Clock Source on SONET/SDH Interfaces• Clock Sources on Channelized Interfaces• Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots• loop-timing on page 547

clocking-mode

Syntax	clocking-mode (dce internal loop);
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For EIA-530 and V.35 interfaces, configure the clock mode. You cannot configure clocking-mode dce on a DTE router using an X.21 serial line protocol (detected automatically when an X.21 cable is plugged into the serial interface).
Options	dce —DCE timing (DTE mode only, not valid for X.21). internal —Internal baud timing. loop —Loop timing. Default: loop
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration
Related Documentation	<ul style="list-style-type: none">• Configuring the Serial Clocking Mode on page 279

compatibility-mode

Syntax	<code>compatibility-mode (adtran digital-link kentrox larscom verilink) <subrate value>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the E3 or T3 interface to be compatible with the channel service unit (CSU) at the remote end of the line.
	<div><p>NOTE: The <code>compatibility-mode</code> statement at the [edit interfaces <i>interface-name</i> e3-options] hierarchy level is not valid for IQE PICs.</p></div>
Default	If you omit this option, the full E3 or T3 rate is used.
Options	<p>adtran—For T3 IQ interfaces only, configure compatibility with Adtran CSUs.</p> <p>digital-link—Configure compatibility with Digital Link CSUs. If you include this option on an E3 interface, you must also disable payload scrambling.</p> <p>kentrox—Configure compatibility with Kentrox CSUs. Kentrox subrate is valid for E3 IQ and T3 IQ interfaces only.</p> <p>larscom—For T3 and T3 IQ interfaces only, configure compatibility with Larscom CSUs.</p> <p>verilink—For T3 IQ and T3 IQE interfaces only, configure compatibility with Verilink CSUs.</p> <div><p>NOTE: Verilink configuration is not functional if an IQ interface is paired with an IQE interface.</p></div> <p>subrate value—Subrate of the E3 or T3 line.</p> <p>Range: For Kentrox CSUs on E3 IQ interfaces and T3 IQ interfaces the subrate value must match the value configured on the CSU. Each increment of the subrate value corresponds to a rate increment of about 0.5 Mbps.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the E3 CSU Compatibility ModeConfiguring the T3 CSU Compatibility Modepayload-scrambler on page 623

compression

See the following sections:

- **compression (PPP Properties)** on page 363
- **compression (Voice Services)** on page 364

compression (PPP Properties)

Syntax	<pre>compression { acfc; pfc; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> ppp-options], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For interfaces with PPP encapsulation, set Link Control Protocol (LCP) compression options. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring PPP Address and Control Field Compression on page 129 • Configuring the PPP Protocol Field Compression on page 130

compression (Voice Services)

Syntax	<pre>compression { rtp { f-max-period <i>number</i>; queues [<i>queue-numbers</i>]; port { minimum <i>port-number</i>; maximum <i>port-number</i>; } } }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the compression properties for voice services traffic. The remaining statements are described separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

compression-device

Syntax	<pre>compression-device <i>interface-name</i>;</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the compression interface for voice services traffic.
Options	<i>interface-name</i> —Logical interface used for compression.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide• Junos OS Interfaces and Routing Configuration Guide

connections

Syntax	<pre>connections { interface-switch <i>connection-name</i> { interface <i>interface-name.unit-number</i>; interface <i>interface-name.unit-number</i>; } }</pre>
Hierarchy Level	[edit protocols]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Define the connection between two circuits in a circuit cross-connect (CCC) connection.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">Defining the Connection for Switching Cross-Connects on page 234Junos OS MPLS Applications Configuration Guide

connectivity-fault-management

```

Syntax  connectivity-fault-management {
        action-profile profile-name {
            default-actions {
                interface-down;
            }
        }
        performance-monitoring {
            delegate-server-processing;
            hardware-assisted-timestamping;
            sla-iterator-profiles {
                profile-name {
                    disable;
                    calculation-weight {
                        delay delay-weight;
                        delay-variation delay-variation-weight;
                    }
                    cycle-time milliseconds;
                    iteration-period connections;
                    measurement-type (loss | statistical-frame-loss | two-way-delay);
                }
            }
        }
        linktrace {
            age (30m | 10m | 1m | 30s | 10s);
            path-database-size path-database-size;
        }
        maintenance-domain domain-name {
            bridge-domain <vlan-id [vlan-ids] >;
            instance routing-instance-name;
            interface interface-name;
            level number;
            name-format (character-string | none | dns | mac+2oct);
            maintenance-association ma-name {
                short-name-format (character-string | vlan | 2octet | rfc-2685-vpn-id);
                continuity-check {
                    convey-loss-threshold;
                    hold-interval minutes;
                    interface-status-tlv;
                    interval (10m | 10s | 1m | 1s | 100ms);
                    loss-threshold number;
                    port-status-tlv;
                }
            }
            mep mep-id {
                auto-discovery;
                direction (up | down);
                interface interface-name (protect | working);
                lowest-priority-defect (all-defects | err-xcon | mac-rem-err-xcon | no-defect |
                    rem-err-xcon | xcon );
                priority number;
                remote-mep mep-id {
                    action-profile profile-name;
                    sla-iterator-profile profile-name {

```

```

        data-tlv-size size;
        iteration-count count-value;
        priority priority-value;
    }
}
}
virtual-switch routing-instance-name {
    bridge-domain name <vlan-ids [vlan-ids] >;
}
}
}

```

Hierarchy Level [edit protocols oam ethernet]

Release Information Statement introduced in Junos OS Release 8.4.

Description For Ethernet interfaces on M7i and M10i routers with Enhanced CFEB (CFEB-E), and on M120, M320, MX Series, and T Series routers, specify connectivity fault management for IEEE 802.1ag Operation, Administration, and Management (OAM) support. In Junos OS Release 9.3 and later, this statement is also supported on aggregated Ethernet interfaces.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- IEEE 802.1ag OAM Connectivity Fault Management Overview
- Example: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers

container-devices

Syntax	container-devices { device-count <i>number</i> ; }
Hierarchy Level	[edit chassis]
Release Information	Statement introduced in Junos OS Release 9.2.
Description	Specify the container devices configuration. The number option specifies the number of sequentially numbered container interfaces, from ci0 to ci127 maximum.
Options	number —Number of container devices. Range: 1 through 128
Required Privilege Level	chassis—To view this statement in the configuration. chassis-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Container Interfaces

container-list

Syntax	container-list [<i>container-interface-names</i>];
Hierarchy Level	[edit interfaces container-options]
Release Information	Statement introduced in Junos OS Release 9.2.
Description	Specify a list of container interfaces; for example: ci0 , ci1 , and up to ci127 .
Options	container-interface-names —Name of each container interface.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Container Interfacescontainer-options on page 369

container-options

Syntax	<pre> container-options { container-list [<i>container-interface-names</i>]; container-type <i>aps</i>; member-interface-type <i>sonet</i> { member-interface-speed [<i>speed</i>]; } }</pre>
Hierarchy Level	[edit interfaces]
Release Information	Statement introduced in Junos OS Release 9.2.
Description	Specify the container interface options.
Options	<p>interface-name—Name of the SONET or the container interface.</p> <p>aps—Specify the member link interface type of the container as APS.</p> <p>sonet—Protocol type of the container interface.</p> <p>speed—Set interface speed to OC3, OC12, OC48, OC192, OC768, or mixed.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Container Interfaces

container-type

Syntax	<pre> container-type <i>aps</i>;</pre>
Hierarchy Level	[edit interfaces container-options]
Release Information	Statement introduced in Junos OS Release 9.2.
Description	Specify the container-options interface type.
Options	<p>aps—Configure the interface type to be Automatic Protection Switching (APS).</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Container Interfaces

continuity-check

Syntax	<pre>continuity-check { convey-loss-threshold; hold-interval <i>minutes</i>; interface-status-tlv; interval (10m 10s 1m 1s 100ms 10ms); loss-threshold <i>number</i>; port-status-tlv; }</pre>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>domain-name</i> maintenance-association <i>ma-name</i>]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	Specify continuity check protocol options.
Options	<p>convey-loss-threshold—Enable loss-threshold-tlv transmission.</p> <p>hold-interval <i>minutes</i>—Specify the continuity check hold-interval, in minutes.</p> <p>interface-status-tlv—Enable interface-status-tlv transmission.</p> <p>interval (<i>10m</i> <i>10s</i> <i>1m</i> <i>1s</i> <i>100ms</i> <i>10ms</i>)—Specify the continuity check interval.</p> <p>loss-threshold <i>minutes</i>—Specify the loss-threshold, in minutes.</p> <p>port-status-tlv—Enable port-status-tlv transmission.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">Continuity Check ProtocolExample: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers

control-channel

Syntax	<code>control-channel <i>channel-name</i> { vlan <i>vlan-id</i>; }</code>
Hierarchy Level	[edit protocols protection-group ethernet-ring <i>name</i> (east-interface west-interface)]
Release Information	Statement introduced in Junos OS Release 9.4.
Description	Configure the Ethernet RPS control channel logical interface to carry the RAPS PDU. The related physical interface is the physical ring port.
Options	vlan <i>vlan-id</i> —If the control channel logical interface is a trunk port, then a dedicated vlan <i>vlan-id</i> defines the dedicated VLAN channel to carry the RAPS traffic. Only configure the vlan-id when the control channel logical interface is the trunk port.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Ethernet Ring Protection Switching Overview

control-polarity

Syntax	<code>control-polarity (negative positive);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For X.21 interfaces only, configure the control signal polarity.
Options	positive —Positive signal polarity. negative —Negative signal polarity. Default: positive
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Serial Signal Polarities on page 284

control-signal

Syntax	control-signal (assert de-assert normal);
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options dce-options], [edit interfaces <i>interface-name</i> serial-options dte-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For X.21 interfaces only, configure the to-DCE signal.
Options	assert —The to-DCE signal must be asserted. de-assert —The to-DCE signal must be deasserted. normal —Normal request-to-send (RTS) signal handling, as defined by ITU-T Recommendation X.21. Default: normal
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Serial Signal Handling on page 281

copy-tos-to-outer-ip-header

Syntax	copy-tos-to-outer-ip-header;
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	For GRE tunnel interfaces only, enable the inner IP header's TOS bits to be copied to the outer IP packet header.
Default	If you omit this statement, the TOS bits in the outer IP header are set to 0.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Class of Service Configuration Guide

core-dump

Syntax	(core-dump no-core-dump);
Hierarchy Level	[edit interfaces <i>mo-fpc/pic/port</i> multiservice-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For monitoring services interfaces only, a useful tool for isolating the cause of a problem. Core dumping is enabled by default. The directory /var/tmp contains core files. The Junos OS saves the current core file (0) and the four previous core files, which are numbered 1 through 4 (from newest to oldest):</p> <ul style="list-style-type: none"> • core-dump—Enable the core dumping operation. • no-core-dump—Disable the core dumping operation.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Multiservice Physical Interface Properties on page 147 • Junos OS Services Interfaces Configuration Guide

crc-major-alarm-threshold

Syntax	crc-major-alarm-threshold (1e-3 5e-4 1e-4 5e-5 1e-5);
Hierarchy Level	[edit interfaces <i>interface-name</i> t1-options]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Major alarm error thresholds for T1 CRC errors. When the threshold is exceeded for one second, a defect condition is declared. If the defect condition continues for the monitoring period, an alarm condition is declared.
Default	10-second monitoring period for all settings except 1e-5. The 1e-5 value uses a 50-second monitoring period.
Options	<p>rate—Error rate expressed as the number of errors per number of bits. The value 1e-3 is one error in 10⁻³ bits and 5e-4 is five errors in 10⁻⁴ bits.</p> <p>Default: 5e-5</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring T1 CRC Error Major Alarm Thresholds

crc-minor-alarm-threshold

Syntax	crc-minor-alarm-threshold (1e-3 5e-4 1e-4 5e-5 1e-5 5e-6 1e-6);
Hierarchy Level	[edit interfaces <i>interface-name</i> t1-options]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Minor alarm error thresholds for T1 CRC errors. When the threshold is exceeded for one second, a defect condition is declared. If the defect condition continues for the monitoring period, an alarm condition is declared.
Default	10-second monitoring period for values 1e-3, 5e-4, 1e-4, and 5e-5. The 1e-5 value uses a 50-second monitoring period. The 5e-6 value uses a 100-second monitoring period. The 1e-6 value uses a 500-second monitoring period.
Options	rate —Error rate expressed as the number of errors per number of bits. The value 1e-3 is one error in 10 ⁻³ bits and 5e-4 is five errors in 10 ⁻⁴ bits. Default: 5e-6
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring T1 CRC Error Minor Alarm Thresholds

cts

Syntax	cts (ignore normal require);
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options dce-options], [edit interfaces <i>interface-name</i> serial-options dte-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For EIA-530 and V.35 interfaces only, configure the from-DCE signal, clear-to-send (CTS).
Options	ignore —The from-DCE signal is ignored. normal —Normal CTS signal handling as defined by the TIA/EIA Standard 530. require —The from-DCE signal must be asserted. Default: normal
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the Serial Signal Handling on page 281

cts-polarity

Syntax	<code>cts-polarity (negative positive);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure CTS signal polarity.
Options	<p>positive—Positive signal polarity.</p> <p>negative—Negative signal polarity.</p> <p>Default: positive</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Serial Signal Polarities on page 284

current

Syntax	<code>current margin;</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> shdsl-options snr-margin],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> shdsl-options snr-margin]</p>
Release Information	Statement introduced in Junos OS Release 7.4.
Description	For J Series Services Routers only, configure the current target signal-to-noise ratio (SNR) margin to be used when training the SHDSL line. The current margin is the difference between desired SNR and the actual SNR. When configured, the line trains at higher than the current margin plus SNR threshold.
Options	<p>margin—Desired current SNR margin. Specify either disabled or a value from 0 dB through 10 dB.</p> <p>Default: 0 dB</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> ATM-over-SHDSL Overview

cycle-time

Syntax	<code>cycle-time <i>cycle-time-value</i>;</code>
Hierarchy Level	<code>[edit protocols oam ethernet connectivity-fault-management performance-monitoring sla-iterator-profiles <i>profile-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 11.1.
Description	Configure the time (in milliseconds) taken between back-to-back transmission of SLA frames for a single connection.
Options	<i>cycle-time-value</i> —Cycle time value in milliseconds. Range: 10 through 3,600,000 Default: 1000 ms
Required Privilege Level	Configure—To enter configuration mode. Control—To modify any configuration.
Related Documentation	<ul style="list-style-type: none">Configuring an Iterator Profile


data-channel

Syntax	<code>data-channel { vlan <i>number</i>; }</code>
Hierarchy Level	<code>[edit protocols protection-group ethernet-ring <i>ring-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 10.2.
Description	For MX Series routers configured for Ethernet ring protection, configure a data channel to define a set of VLAN IDs that belong to a ring instance.
Options	<i>vlan number</i> —Define one or more VLANs that belong to a ring instance.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Ethernet Ring Protection Using Ring Instances for Load BalancingExample: Configuring Load Balancing Within Ethernet Ring Protection for MX Series Routers

data-input

Syntax	<code>data-input (system interface <i>interface-name</i>);</code>
Hierarchy Level	<code>[edit interfaces <i>ds-pim</i>/0/<i>port:channel</i>]</code>
Release Information	Statement introduced in Junos OS Release 8.2.
Description	<p>For interfaces operating on T1/E1 PIMs for J Series Services Routers only, configure whether an interface should send and receive data from the Routing Engine or from a given interface name. On channelized T1/E1 interfaces partitioned into channels, you can insert time slots from one port directly into the other port on the same PIM, to replace time slots coming through the Routing Engine.</p> <p>To avoid slips, both ports must use the same clock source: either the router's internal clock or an external clock on one of the interfaces. If an external clock source is required, one interface must specify clocking external and the other must specify the same clock by including the clocking external interface <i>interface-name</i> statement at the <code>[edit interfaces <i>interface-name</i>]</code> hierarchy level.</p>
Options	<p>system—Interface sends and receives data from the Routing Engine.</p> <p>interface <i>interface-name</i>—Interface sends and receives data from a specific interface.</p> <p>Default: Data is sent and received from the Routing Engine (system).</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots <i>Junos OS Interfaces and Routing Configuration Guide</i> clocking on page 360

data-tlv-size

Syntax	<code>data-tlv-size size;</code>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>md-name</i> maintenance-association <i>ma-name</i> mep <i>mep-id</i> remote-mep <i>remote-mep-id</i> sla-iterator-profile <i>profile-name</i>]
Release Information	Statement introduced in Junos OS Release 11.1.
Description	Configure the size of the data TLV portion of the Y.1731 data frame.
Options	<i>size</i> —Size of the data TLV portion of the Y.1731 data frame.
<div> NOTE: This option is applicable only for two-way delay measurement.</div>	
Range: 1 through 1400 bytes	
Default: 1	
Required Privilege Level	Configure—To enter configuration mode. Control—To modify any configuration.
Related Documentation	<ul style="list-style-type: none">• sla-iterator-profile on page 706• Configuring a Remote MEP with an Iterator Profile

dcd

Syntax	dcd (ignore normal require);
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options dce-options], [edit interfaces <i>interface-name</i> serial-options dte-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For EIA-530 and V.35 interfaces only, configure the from-DCE signal, data-carrier-detect (DCD).
Options	<p>ignore—The from-DCE signal is ignored.</p> <p>normal—Normal DCD signal handling as defined by the TIA/EIA Standard 530.</p> <p>require—The from-DCE signal must be asserted.</p> <p>Default: normal</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring the Serial Signal Handling on page 281

dcd-polarity

Syntax	dcd-polarity (negative positive);
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure DCD signal polarity.
Options	<p>positive—Positive signal polarity.</p> <p>negative—Negative signal polarity.</p> <p>Default: positive</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Serial Signal Polarities on page 284

dce

Syntax	dce;
Hierarchy Level	[edit interfaces <i>interface-name</i>], [edit interfaces <i>interface-name</i> serial-options clocking-mode]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Frame Relay only, respond to status enquiry message keepalives. When you configure the router to be a DCE, keepalives are disabled by default.
Default	The router operates in DTE mode.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the Router as a DCE with Frame Relay Encapsulation

dce-options

Syntax	dce-options { control-signal (assert de-assert normal); cts (ignore normal require); dcd (ignore normal require); dsr (ignore normal require); dtr <i>signal-handling-option</i> ; ignore-all; indication (ignore normal require); rts (assert de-assert normal); tm (ignore normal require); }
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced in Junos OS Release 8.3. Statement previously known as control-leads .
Description	For J Series Services Routers, configure the serial interface signal characteristics. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the Serial Signal Handling on page 281

deactivation-delay

Syntax	<code>deactivation-delay <i>seconds</i>;</code>
Hierarchy Level	<code>[edit interfaces <i>dl</i>n unit <i>logical-unit-number</i> dialer-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	On J Series Services Routers with ISDN interfaces, configure the ISDN deactivation delay. Used only for dialer backup and dialer watch cases.
Options	<p><i>seconds</i>—Interval before the backup interface is deactivated after the primary interface has come up.</p> <p>Range: 1 through 4,294,967,295 seconds</p> <p>Default: 0 (zero)</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring ISDN Logical Interface Properties <i>Junos OS Interfaces and Routing Configuration Guide</i>

default-actions

Syntax	<pre>default-actions { interface-down; }</pre>
Hierarchy Level	<code>[edit protocols oam ethernet connectivity-fault-management action-profile <i>profile-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 8.4.
Description	Define the action to be taken when connectivity to the remote MEP is lost.
Default	If no action is configured, no action is taken.
Options	<i>interface-down</i> —When a remote MEP connectivity failure is detected, bring the interface down.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring a Connectivity Fault Management Action Profile

default-chap-secret

Syntax	<code>default-chap-secret name;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> ppp-options chap], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options chap], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options chap]
Release Information	Statement introduced in Junos OS Release 8.0.
Description	<p>Define the default CHAP secret to be used when no matching CHAP access profile exists.</p> <p>For ATM2 IQ interfaces only, you can configure a default CHAP secret on the logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:</p> <ul style="list-style-type: none">• atm-ppp-llc—PPP over AAL5 LLC encapsulation.• atm-ppp-vc-mux—PPP over AAL5 multiplex encapsulation.
Default	If you do not include the default-chap-secret statement in the configuration, and an interface receives a CHAP challenge or response from a peer that is not in the applied access profile, the link is immediately dropped.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring a Default CHAP Secret on page 123• access-profile on page 295


default-pap-password

Syntax	<code>default-pap-password password;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options pap], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options pap]
Release Information	Statement introduced in Junos OS Release 8.3.
Description	For PAP authentication, the default PAP password.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring a Default PAP Password on page 172• access-profile on page 295


delay (PPPoE Service Name Tables)

Syntax	<code>delay seconds;</code>
Hierarchy Level	[edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i>], [edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i> agent-specifier aci <i>circuit-id-string</i> ari <i>remote-id-string</i>]
Release Information	Statement introduced in Junos OS Release 10.0. Support at [edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i> agent-specifier aci <i>circuit-id-string</i> ari <i>remote-id-string</i>] hierarchy level introduced in Junos OS Release 10.2.
Description	Direct the PPPoE underlying interface to wait a specified number of seconds after receiving a PPPoE Active Discovery Initiation (PADI) control packet from a PPPoE client before sending a PPPoE Active Discovery Offer (PADO) packet to indicate that it can service the client request.
Options	seconds —Number of seconds that the PPPoE underlying interface waits after receiving a PADI packet from a PPPoE client before sending a PADO packet in response. Range: 1 through 120 seconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring PPPoE Service Name Tables

delay

Syntax	<code>delay <i>delay-value</i>;</code>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management performance-monitoring sla-iterator-profiles <i>profile-name</i> calculation-weight]
Release Information	Statement introduced in Junos OS Release 11.1.
Description	Configure the calculation weight for delay.
Options	<i>delay-value</i> —Calculation weight for delay.
<div> NOTE: This option is applicable only for two-way delay measurement.</div>	
Range: 1 through 65,535	
Default: 1	
Required Privilege Level	Configure—To enter configuration mode. Control—To modify any configuration.
Related Documentation	<ul style="list-style-type: none">Configuring an Iterator Profilecalculation-weight on page 348

delay-variation

Syntax	<code>delay-variation <i>delay-variation-value</i>;</code>
Hierarchy Level	<code>[edit protocols oam ethernet connectivity-fault-management performance-monitoring sla-iterator-profiles <i>profile-name</i> calculation-weight]</code>
Release Information	Statement introduced in Junos OS Release 11.1.
Description	Configure the calculation weight for delay variation.
Options	<i>delay-variation-value</i> —Calculation weight for delay variation.
<div>  <p>NOTE: This option is applicable only for two-way delay measurement.</p> </div>	
<p>Range: 1 through 65,535</p> <p>Default: 1</p>	
Required Privilege Level	Configure—To enter configuration mode. Control—To modify any configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring an Iterator Profile calculation-weight on page 348

delegate-server-processing

Syntax	<code>delegate-server-processing;</code>
Hierarchy Level	<code>[edit protocols oam ethernet connectivity-fault-management performance-monitoring]</code>
Release Information	Statement introduced in Junos OS Release 11.1.
Description	<p>For Ethernet interfaces on Enhanced and Enhanced Queuing Dense Port Concentrators (DPCs) in MX Series routers only, enable server-side processing for two-way delay measurement and loss measurement.</p> <p>By default, the processing is done by the Routing Engine.</p>
Required Privilege Level	trace—To view this statement in the configuration. trace-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Ethernet Frame Delay Measurements Overview

delimiter


Syntax	<code>delimiter <i>delimiter-character</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> auto-configure vlan-ranges authentication username-include], [edit interfaces <i>interface-name</i> auto-configure stacked-vlan-ranges authentication username-include]
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Specify the character used as the delimiter between the concatenated components of the username. You cannot use the semicolon (;) as a delimiter.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring VLAN Interface Username Information for AAA Authentication

demux-destination

See the following sections:

- **demux-destination (Underlying Interface)** on page 387
- **demux-destination (Demux Interface)** on page 388

demux-destination (Underlying Interface)

Syntax	<code>demux-destination family;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 9.0. Support for aggregated Ethernet added in Junos OS Release 9.4.
Description	Configure the logical demultiplexing (demux) destination family type on the IP demux underlying interface.
<div>  <p>NOTE: The IP demux interface feature currently supports only Fast Ethernet, Gigabit Ethernet, 10-Gigabit Ethernet, or aggregated Ethernet underlying interfaces.</p> </div>	
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring an IP Demux Underlying Interface on page 259

demux-destination (Demux Interface)

Syntax	<code>demux-destination { <code>destination-prefix</code>; }</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>]
Release Information	Statement introduced in Junos OS Release 9.0. Support for aggregated Ethernet added in Junos OS Release 9.4.
Description	Configure one or more logical demultiplexing (demux) destination prefixes. The prefixes are matched against the destination address of packets that the underlying interface receives. When a match occurs, the packet is processed as if it was received on the demux interface.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring IP Demux Prefixes on page 262

demux-options

Syntax	<code>demux-options { underlying-interface <i>interface-name</i> }</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 9.0.
Description	Configure logical demultiplexing (demux) interface options. The statement is explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Specifying the Demux Underlying Interface on page 261

demux-source


See the following sections:

- **demux-source (Demux Interface)** on page 389
- **demux-source (Underlying Interface)** on page 390

demux-source (Demux Interface)

Syntax	<pre>demux-source { source-prefix; }</pre>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.0.</p> <p>Support for aggregated Ethernet added in Junos OS Release 9.4.</p>
Description	<p>Configure one or more logical demultiplexing (demux) source prefixes. The prefixes are matched against the source address of packets that the underlying interface receives. When a match occurs, the packet is processed as if it was received on the demux interface.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring IP Demux Prefixes on page 262

demux-source (Underlying Interface)

Syntax	<code>demux-source <i>family</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],
Release Information	Statement introduced in Junos OS Release 9.0. Support for aggregated Ethernet added in Junos OS Release 9.4.
Description	Configure the logical demultiplexing (demux) source family type on the IP demux underlying interface.
<div> NOTE: The IP demux interface feature currently supports only Fast Ethernet, Gigabit Ethernet, 10-Gigabit Ethernet, or aggregated Ethernet underlying interfaces.</div>	
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring an IP Demux Underlying Interface on page 259

demux0 (Static Interface)

```

Syntax  demux0 {
            unit logical-unit-number {
                demux-options {
                    underlying-interface interface-name
                }
                family family {
                    access-concentrator name;
                    {
                        destination-prefix;
                    }
                    duplicate-protection;
                    dynamic-profile profile-name;
                    {
                        source-prefix;
                    }
                    max-sessions number;
                    service-name-table table-name
                    targeted-distribution;
                    unnumbered-address interface-name <preferred-source-address address>;
                }
                vlan-id number;
                vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
            }
        }

```

Hierarchy Level [edit interfaces],
[edit logical-systems *logical-system-name* interfaces]

Release Information Statement introduced in Junos OS Release 9.0.

Description Configure the logical demultiplexing (demux) interface.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Specifying the Demux Underlying Interface on page 261
- Configuring IP Demux Prefixes on page 262

description

Syntax	<code>description text;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i>],</code> <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	<p>Provide a textual description of the interface or the logical unit. Any descriptive text you include is displayed in the output of the show interfaces commands, and is also exposed in the ifAlias Management Information Base (MIB) object. It has no effect on the operation of the interface on the router or switch.</p> <p>The textual description can also be included in the extended DHCP relay option 82 Agent Circuit ID suboption.</p>
Options	text —Text to describe the interface. If the text includes spaces, enclose the entire text in quotation marks.
Required Privilege Level	<code>interface</code> —To view this statement in the configuration. <code>interface-control</code> —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Adding an Interface Description to the Configuration on page 104• Adding a Logical Unit Description to the Configuration on page 164• Configuring Gigabit Ethernet Interfaces (CLI Procedure)• Enabling and Disabling Insertion of Option 82 Information

destination

See the following sections:

- **destination (IPCP) on page 393**
- **destination (Routing Instance) on page 394**
- **destination (Tunnels) on page 394**



NOTE: For information about the destination statement at the [edit interfaces *interface-name* unit *unit-number* family inet address *address* (vrrp-group | vrrp-inet6-group) *group-number*] or [edit logical-systems *logical-system-name* interfaces *interface-name* unit *unit-number* family (inet | inet6) address *address* (vrrp-group | vrrp-inet6-group) *group-number*] hierarchy level, see the [Junos OS High Availability Configuration Guide](#).

destination (IPCP)

Syntax	<code>destination <i>address</i> destination-profile <i>profile-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet unnumbered-address <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet unnumbered-address <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	For unnumbered interfaces with PPP encapsulation, specify the IP address of the remote interface.
Options	<i>address</i> —IP address of the remote interface. The remaining statement is explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring IPCP Options on page 187 • address on page 306 • negotiate-address on page 590 • Junos OS System Basics Configuration Guide

destination (Routing Instance)

Syntax	<code>destination <i>routing-instance-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel routing-instance], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel routing-instance]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the destination routing instance that points to the routing table containing the tunnel destination address.
Default	The default Internet routing table <code>inet.0</code> .
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

destination (Tunnels)

Syntax	<code>destination <i>address</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet address <i>address</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet unnumbered-address <i>interface-name</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet address <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet unnumbered-address <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For encryption, PPP-encapsulated, and tunnel interfaces, specify the remote address of the connection.
Options	<i>address</i> —Address of the remote side of the connection.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Interface Address on page 182• Junos OS Services Interfaces Configuration Guide• point-to-point on page 633

destination-class-usage

Syntax	<code>destination-class-usage;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet accounting], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet accounting]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Enable packet counters on an interface that count packets that arrive from specific customers and are destined for specific prefixes on the provider core router.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Enabling Source Class and Destination Class Usage on page 218 accounting on page 296 source-class-usage on page 714

destination-profile

Syntax	<code>destination-profile name;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet address <i>address</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet unnumbered-address <i>interface-name</i> destination <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet address <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet unnumbered-address <i>interface-name</i> destination <i>address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	For interfaces with PPP encapsulation, assign PPP properties to the remote destination end. You define the profile at the [edit access group-profile <i>name</i> ppp] hierarchy level.
Options	<i>name</i> —Profile name defined at the [edit access group-profile <i>name</i> ppp] hierarchy level.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring IPCP Options on page 187 destination (IPCP) on page 393 Junos OS System Basics Configuration Guide

dial-options

Syntax	<pre>dial-options { l2tp-interface-id <i>name</i>; (shared dedicated); }</pre>
Hierarchy Level	[edit interfaces <i>sp-fpc/pic/port</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the Layer 2 Tunneling Protocol (L2TP) options for configuring logical interfaces for group and user sessions.
Options	<p>l2tp-interface-id <i>name</i>—Interface identifier that you specified at the [edit access profile <i>name</i>] hierarchy level.</p> <p>(shared dedicated)—Specify whether a logical interface can host one (dedicated) or multiple (shared) sessions at one time.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

dial-string

Syntax	<pre>dial-string [<i>dial-string-numbers</i>];</pre>
Hierarchy Level	[edit interfaces <i>br-pim/O/port</i> unit <i>logical-unit-number</i> dialer-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>br-pim/O/port</i> unit <i>logical-unit-number</i> dialer-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	On J Series Services Routers with ISDN interfaces, specify one or more ISDN dial strings used to reach a destination subnetwork.
Options	<i>dial-string-numbers</i> —One or more strings of numbers to call.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Dialer Interface

dialer

Syntax	<code>dialer <i>filter-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Apply a dialer filter to an interface. To create the dialer filter, include the dialer-filter statement at the [edit firewall filter family <i>family</i>] hierarchy level.
Options	<i>filter-name</i> —Dialer filter name.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Applying the Dial-on-Demand Dialer Filter to the Dialer Interfaces<i>Junos OS Interfaces and Routing Configuration Guide</i>

dialer-options

Syntax	<pre>dialer-options { activation-delay <i>seconds</i>; callback; callback-wait-period <i>time</i>; deactivation-delay <i>seconds</i>; dial-string [<i>dial-string-numbers</i>]; idle-timeout <i>seconds</i>; incoming-map { caller <i>caller-number</i> accept-all; initial-route-check <i>seconds</i>; load-interval <i>seconds</i>; load-threshold <i>percent</i>; pool <i>pool-name</i>; redial-delay <i>time</i>; watch-list { [<i>routes</i>]; } } }</pre>
Hierarchy Level	<pre>[edit interfaces umd0], [edit interfaces dln unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces dln unit <i>logical-unit-number</i>]</pre>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Specify the dialer options for configuring logical interfaces for group and user sessions.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring ISDN Logical Interface Properties• Specifying a USB Modem Interface on J Series Routers on page 102• Junos OS Services Interfaces Configuration Guide

dialin

Syntax	dialin (console routable);
Hierarchy Level	[edit interfaces umd0 modem-options]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	For J Series Services Routers, configure a USB modem port to act as a dial-in console or WAN backup port.
Options	console —Configure the USB modem port to operate as a dial-in console for management. routable —Configure the USB modem port to operate as a dial-in WAN backup interface. Default: console
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Specifying a USB Modem Interface on J Series Routers on page 102

direction

Syntax	direction (up down);
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>domain-name</i> maintenance-association <i>ma-name</i> mep <i>mep-id</i>]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	Configure the direction of the MEP.
Options	up —An UP MEP CCM is transmitted out of every logical interface which is part of the same bridging or vpls instance except for the interface configured on this MEP. down —Down MEP CCMs are transmitted only out the interface configured on this MEP.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring a Maintenance Endpoint Example: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers IEEE 802.1ag OAM Connectivity Fault Management Overview

disable

See the following sections:

- **disable (Interface)** on page 400
- **disable (Link Protection)** on page 401

disable (Interface)

Syntax	disable;
Hierarchy Level	[edit interfaces <i>interface-name</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Disable a physical or a logical interface, effectively unconfiguring it.



CAUTION: Dynamic subscribers and logical interfaces use physical interfaces for connection to the network. The Junos OS allows you to set the interface to disable and commit the change while dynamic subscribers and logical interfaces are still active. This action results in the loss of all subscriber connections on the interface. Use care when disabling interfaces.



NOTE: When you use the `disable` statement at the `edit interfaces` hierarchy level, depending on the PIC type, the interface might or might not turn off the laser. Older PIC transceivers do not support turning off the laser, but newer Gigabit Ethernet (GE) PICs with SFP and XFP transceivers do support it and the laser will be turned off when the interface is disabled.



WARNING: Do not stare into the laser beam or view it directly with optical instruments even if the interface has been disabled.

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
---------------------------------	---

Related Documentation	<ul style="list-style-type: none">• Disabling a Physical Interface on page 149• Disabling a Logical Interface on page 175
------------------------------	--

disable (Link Protection)

Syntax	disable;
Hierarchy Level	[edit interfaces aeX aggregated-ether-options lacp link-protection]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Disable LACP link protection on the interface.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Aggregated Ethernet LACP

disable-mlppp-inner-ppp-pfc

Syntax	disable-mlppp-inner-ppp-pfc;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	For MLPPP interfaces only, disable compression of the inner PPP header in the MLPPP payload. By default, compression is enabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

dlci

Syntax	<code>dlci <i>dlci-identifier</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	<p>For Frame Relay and Multilink Frame Relay (MLFR) user-to-network interface (UNI) network-to-network interface (NNI) encapsulation only, and for link services, voice services and point-to-point interfaces only, configure the data-link connection identifier (DLCI) for a permanent virtual circuit (PVC) or an switched virtual circuit (SVC).</p> <p>To configure a DLCI for a point-to-multipoint interface, use the multipoint-destination statement to specify the DLCI.</p>
Options	<p><i>dlci-identifier</i>—Data-link connection identifier.</p> <p>Range: 16 through 1022.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Data-Link Connection Identifiers on Channelized Interfaces• Configuring Frame Relay DLCIs• Junos OS Services Interfaces Configuration Guide• encapsulation (Logical Interface) on page 421• multicast-dlci on page 578• multipoint-destination on page 582

do-not-fragment

Syntax	do-not-fragment;
Hierarchy Level	[edit interfaces <i>gr-fpc/pic/port</i> unit <i>logical-unit-number</i> tunnel], [edit logical-systems <i>logical-system-name</i> interfaces <i>gr-fpc/pic/port</i> unit <i>logical-unit-number</i> tunnel]
Release Information	Statement introduced in Junos OS Release 9.2.
Description	Disable fragmentation of GRE encapsulated packets.
Default	By default fragmentation is disabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide• reassemble-packets on page 668

domain-name

Syntax	<code>domain-name <i>domain-name-string</i>;</code>
Hierarchy Level	<code>[edit forwarding-options dhcp-relay authentication username-include],</code> <code>[edit forwarding-options dhcp-relay group <i>group-name</i> authentication username-include],</code> <code>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay authentication</code> <code>username-include],</code> <code>[edit logical-systems <i>logical-system-name</i> forwarding-options dhcp-relay group <i>group-name</i></code> <code>authentication username-include],</code> <code>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i></code> <code>forwarding-options dhcp-relay authentication username-include],</code> <code>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i></code> <code>forwarding-options dhcp-relay group <i>group-name</i> authentication username-include],</code> <code>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay authentication</code> <code>username-include],</code> <code>[edit routing-instances <i>routing-instance-name</i> forwarding-options dhcp-relay group</code> <code><i>group-name</i> authentication username-include]</code>
Release Information	Statement introduced in Junos OS Release 9.1.
Description	Specify the domain name that is concatenated with the username during the subscriber authentication process.
Options	<i>domain-name-string</i> —The domain name formatted string.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Using External AAA Authentication Services with DHCP

dot1x

Syntax	<pre>dot1x { authenticator { authentication-profile-name <i>access-profile-name</i>; interface <i>interface-id</i> { maximum-requests <i>integer</i>; quiet-period <i>seconds</i>; reauthentication (disable interval <i>seconds</i>); retries <i>integer</i>; server-timeout <i>seconds</i>; supplicant (<i>single</i>); supplicant-timeout <i>seconds</i>; transmit-period <i>seconds</i>; } } }</pre>
Hierarchy Level	[edit protocols]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	<p>For the MX Series only, specifies settings for using 802.1x Port-Based Network Access Control.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IEEE 802.1x Port-Based Network Access Control Overview • authenticator on page 326 • authentication-profile-name on page 325 • interface (IEEE 802.1x) on page 495

down-count

Syntax	<code>down-count <i>cells</i>;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i> oam-liveness],</code> <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> oam-liveness],</code> <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i></code> <code> multipoint-destination <i>address</i> oam-liveness],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i></code> <code> oam-liveness],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i></code> <code> family <i>family</i> address <i>address</i> multipoint-destination <i>address</i> oam-liveness]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM encapsulation only, configure Operation, Administration, and Maintenance (OAM) F5 loopback cell count thresholds. This feature is not supported on ATM-over-SHDSL interfaces.</p> <p>For ATM2 IQ PICs only, configure OAM F4 loopback cell count thresholds at the <code>[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i>]</code> hierarchy level.</p>
Options	<p><i>cells</i>—Minimum number of consecutive OAM F4 or F5 loopback cells lost before a VC is declared down.</p> <p>Range: 1 through 255</p> <p>Default: 5 cells</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">Configuring the ATM OAM F5 Loopback Cell Threshold

drop (PPPoE Service Name Tables)

Syntax	<code>drop;</code>
Hierarchy Level	[edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i>], [edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i> agent-specifier aci <i>circuit-id-string</i> ari <i>remote-id-string</i>]
Release Information	Statement introduced in Junos OS Release 10.0. Support at [edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i> agent-specifier aci <i>circuit-id-string</i> ari <i>remote-id-string</i>] hierarchy level introduced in Junos OS Release 10.2.
Description	Direct the router to drop (ignore) a PPPoE Active Discovery Initiation (PADI) control packet received from a PPPoE client that contains the specified service name tag or agent circuit identifier/agent remote identifier (ACI/ARI) information. This action effectively denies the client's request to provide the specified service, or to accept requests from the subscriber or subscribers represented by the ACI/ARI information.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring PPPoE Service Name Tables

drop-timeout

Syntax	<code>drop-timeout <i>milliseconds</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For link services, multilink, and voice services interfaces only, configure the drop timeout period, in milliseconds.
Options	<i>milliseconds</i> —Drop timeout period. Range: 0 through 2000 milliseconds Default: 0 ms (disabled)
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Junos OS Services Interfaces Configuration Guide

ds0-options

Syntax	<pre>ds0-options { bert-algorithm <i>algorithm</i>; bert-error-rate <i>rate</i>; bert-period <i>seconds</i>; byte-encoding (nx56 nx64); fcs (16 32); idle-cycle-flag (flags ones); invert-data; loopback <i>payload</i>; start-end-flag (filler shared); }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure DS0-specific physical interface properties.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">Configuring Channelized DS3-to-DS0 Interfaces

dsl-options

Syntax	<pre>dsl-options { loopback <i>local</i>; operating-mode <i>mode</i>; }</pre>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For J Series Services Routers only, modify the properties of the digital subscriber line for an ATM interface.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">ATM-over-ADSL OverviewJunos OS Interfaces and Routing Configuration Guide

dsr

Syntax	<code>dsr (ignore normal require);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options dce-options], [edit interfaces <i>interface-name</i> serial-options dte-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For EIA-530 and V.35 interfaces only, configure the from-DCE signal, data-set-ready (DSR).
Options	<p>ignore—The from-DCE signal is ignored.</p> <p>normal—Normal DSR signal handling as defined by the TIA/EIA Standard 530.</p> <p>require—The from-DCE signal must be asserted.</p> <p>Default: normal</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring the Serial Signal Handling on page 281

dsr-polarity

Syntax	<code>dsr-polarity (negative positive);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure DSR signal polarity.
Options	<p>positive—Positive signal polarity.</p> <p>negative—Negative signal polarity.</p> <p>Default: positive</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Serial Signal Polarities on page 284

dte-options

Syntax	<pre>dte-options { control-signal (assert de-assert normal); cts (ignore normal require); dcd (ignore normal require); dsr (ignore normal require); dtr <i>signal-handling-option</i>; ignore-all; indication (ignore normal require); rts (assert de-assert normal); tm (ignore normal require); }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced in Junos OS Release 8.3. Statement previously known as control-leads .
Description	For M Series and T Series routers, configure the serial interface signal characteristics. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the Serial Signal Handling on page 281

dtr

Syntax	<code>dtr <i>signal-handling-option</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options dce-options], [edit interfaces <i>interface-name</i> serial-options dte-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For EIA-530 and V.35 interfaces only, configure the to-DCE signal, data-transmit-ready (DTR).
Options	<p><i>signal-handling-option</i>—Signal handling for the DTR signal. The signal handling can be one of the following:</p> <p>assert—The to-DCE signal must be asserted.</p> <p>auto-synchronize—Normal DTR signal with automatic synchronization. This statement has two substatements:</p> <p>duration <i>milliseconds</i>—Pulse duration of resynchronization. Range: 1 through 1000 milliseconds Default: 1000 milliseconds</p> <p>interval <i>seconds</i>—Offset interval for resynchronization. Range: 1 through 31 seconds Default: 15 seconds</p> <p>de-assert—The to-DCE signal must be deasserted.</p> <p>normal—Normal DTR signal handling as defined by the TIA/EIA Standard 530. Default: normal</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring the Serial Signal Handling on page 281

dtr-circuit

Syntax	dtr-circuit (balanced unbalanced);
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For EIA-530 and V.35 interfaces only, configure a DTR circuit.
Options	balanced —Balanced DTR signal. unbalanced —Unbalanced DTR signal. Default: balanced
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the Serial DTR Circuit on page 284

dtr-polarity

Syntax	dtr-polarity (negative positive);
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure DTR signal polarity.
Options	positive —Positive signal polarity. negative —Negative signal polarity. Default: positive
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Serial Signal Polarities on page 284

dump-on-flow-control

Syntax	dump-on-flow-control;
Hierarchy Level	[edit interfaces <i>interface-name</i> multiservice-options]
Description	This option supports high availability functionality and can be used with various service interfaces, including rsp , rms , lsq , and rlsq .
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Multiservice Physical Interface Properties on page 147• Junos OS Services Interfaces Configuration Guide• passive-monitor-mode on page 620

dynamic-call-admission-control

Syntax	<pre>dynamic-call-admission-control { activation-priority <i>priority</i>; bearer-bandwidth-limit <i>kilobits-per-second</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	<p>(J4350 and J6350 Services Routers supporting voice over IP with the TGM550 media gateway module) For Fast Ethernet and Gigabit Ethernet interfaces, ISDN BRI interfaces, and serial interfaces with PPP or Frame Relay encapsulation, configure dynamic call admission control (CAC). Dynamic CAC provides enhanced control over WAN bandwidth. When dynamic CAC is configured on an interface responsible for providing call bandwidth, the TGM550 informs the Media Gateway Controller (MGC) of the bandwidth limit available for voice packets on the interface and requests the MGC to block new calls when the bandwidth is exhausted.</p> <p>Dynamic CAC must be configured on each Services Router interface responsible for providing call bandwidth.</p> <p>The statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Dynamic Call Admission Control on page 174Junos OS Services Interfaces Configuration GuideJunos OS Interfaces and Routing Configuration Guide

dynamic-profile

See the following sections:

- **dynamic-profile (PPPoE Service Name Tables)** on page 415
- **dynamic-profile (Stacked VLAN)** on page 416
- **dynamic-profile (VLAN)** on page 416

dynamic-profile (PPPoE Service Name Tables)

Syntax	<code>dynamic-profile <i>profile-name</i>;</code>
Hierarchy Level	<code>[edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i>],</code> <code>[edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i> agent-specifier</code> <code>aci <i>circuit-id-string</i> ari <i>remote-id-string</i>]</code>
Release Information	Statement introduced in Junos OS Release 10.2.
Description	<p>Specify a dynamic profile to instantiate a dynamic PPPoE interface. You can associate a dynamic profile with a named service entry, empty service entry, or any service entry configured in a PPPoE service name table, or with an agent circuit identifier/agent remote identifier (ACI/ARI) pair defined for these services.</p> <p>The dynamic profile associated with a service entry in a PPPoE service name table overrides the dynamic profile associated with the PPPoE underlying interface on which the dynamic PPPoE interface is created.</p> <p>If you include the dynamic-profile statement at the <code>[edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i> agent-specifier aci <i>circuit-id-string</i> ari <i>remote-id-string</i>]</code> hierarchy level, you cannot also include the static-interface statement at this level. The dynamic-profile and static-interface statements are mutually exclusive for ACI/ARI pair configurations.</p>
Options	<i>profile-name</i> —Name of the dynamic profile that the router uses to instantiate a dynamic PPPoE interface.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring PPPoE Service Name Tables • Assigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation

dynamic-profile (Stacked VLAN)

Syntax	<pre>dynamic-profile <i>profile-name</i> { accept (any dhcp-v4 dhcp-v6 inet inet6 pppoe); ranges (any <i>low-tag-high-tag</i>) ,(any <i>low-tag-high-tag</i>); }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> auto-configure stacked-vlan-ranges]
Release Information	Statement introduced in Junos OS Release 9.5.
Description	Configure a dynamic profile for use when configuring dynamic stacked VLANs.
Options	<p><i>profile-name</i>—Name of the dynamic profile that you want to use when configuring dynamic stacked VLANs.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Dynamic Profiles Overview• Configuring a Basic Dynamic Profile• Associating a Stacked VLAN Dynamic Profile with an Interface

dynamic-profile (VLAN)

Syntax	<pre>dynamic-profile <i>profile-name</i> { accept (any dhcp-v4 dhcp-v6 inet inet6 pppoe); ranges (any <i>low-tag</i>)—(any <i>high-tag</i>); }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> auto-configure vlan-ranges]
Release Information	Statement introduced in Junos OS Release 9.5.
Description	Configure a dynamic profile for use when configuring dynamic VLANs.
Options	<p><i>profile-name</i>—Name of the dynamic profile that you want to use when configuring dynamic VLANs.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Dynamic Profiles Overview• Configuring a Basic Dynamic Profile• Associating a Single-Tag VLAN Dynamic Profile with an Interface

e1-options

Syntax	<pre>e1-options { bert-algorithm <i>algorithm</i>; bert-error-rate <i>rate</i>; bert-period <i>seconds</i>; fcs (16 32); framing (g704 g704-no-crc4 unframed); idle-cycle-flag (flags ones); invert-data; loopback (local remote); start-end-flag (filler shared); timeslots <i>time-slot-range</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure E1-specific physical interface properties.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Channelized E1 IQ and IQE Interfaces Overview • Channelized STM1 Interfaces Overview • E1 Interfaces Overview • T1 Interfaces Overview

e3-options

Syntax e3-options {
 atm-encapsulation (direct | plcp);
 bert-algorithm *algorithm*;
 bert-error-rate *rate*;
 bert-period *seconds*;
 buildout *feet*;
 compatibility-mode (digital-link | kentrox | larscom) <subrate *value*>;
 fcs (16 | 32);
 framing (g.751 | g.832);
 idle-cycle-flag *value*;
 invert-data;
 loopback (local | remote);
 (payload-scrambler | no-payload-scrambler);
 start-end-flag *value*;
 (unframed | no-unframed);
 }

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure E3-specific physical interface properties.

For ATM1 interfaces, you can configure a subset of E3 options statements.

The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

Related Documentation

- E3 Interfaces Overview
- T3 Interfaces Overview
- atm-options on page 322

east-interface

Syntax east-interface {
 node-id *mac-address*;
 control-channel *channel-name* {
 ring-protection-link-end;
 }

Hierarchy Level [edit protocols **protection-group** ethernet-ring *ring-name*]

Release Information Statement introduced in Junos OS Release 9.4.

Description Define one of the two interface ports for Ethernet ring protection, the other being defined by the **west-interface** statement at the same hierarchy level. The interface must use the control channel's logical interface name. The control channel is a dedicated VLAN channel for the ring port.



NOTE: Always configure this port first, before configuring the **west-interface** statement.

The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

Related Documentation

- Ethernet Ring Protection Switching Overview
- Ethernet Ring Protection Using Ring Instances for Load Balancing
- **west-interface** on page 810

encapsulation

See the following sections:

- [encapsulation \(Container Interface\) on page 420](#)
- [encapsulation \(Logical Interface\) on page 421](#)
- [encapsulation \(Physical Interface\) on page 424](#)

encapsulation (Container Interface)

Syntax	<code>encapsulation (cisco-hdlc ppp);</code>
Hierarchy Level	[edit interfaces <i>cin</i>]
Release Information	Statement introduced in Junos OS Release 9.2.
Description	Container link-layer encapsulation type.
Options	cisco-hdlc —Use Cisco-compatible High-Level Data Link Control (HDLC) framing. ppp —Use serial PPP encapsulation.
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Container Interfaces

encapsulation (Logical Interface)

Syntax	encapsulation (atm-ccc-cell-relay atm-ccc-vc-mux atm-cisco-nlpid atm-mlppp-llc atm-nlpid atm-ppp-llc atm-ppp-vc-mux atm-snap atm-tcc-snap atm-tcc-vc-mux atm-vc-mux ether-over-atm-llc ether-vpls-over-atm-llc ether-vpls-over-fr ether-vpls-over-ppp ethernet frame-relay-ccc frame-relay-ether-type frame-relay-ether-type-tcc frame-relay-ppp frame-relay-tcc multilink-frame-relay-end-to-end multilink-ppp ppp-over-ether ppp-over-ether-over-atm-llc vlan-bridge vlan-ccc vlan-vci-ccc vlan-tcc vlan-vpls);
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>] [edit interfaces <i>rlsnumber</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Logical link-layer encapsulation type.
Options	<p>atm-ccc-cell-relay—Use ATM cell-relay encapsulation.</p> <p>atm-ccc-vc-mux—Use ATM virtual circuit (VC) multiplex encapsulation on CCC circuits. When you use this encapsulation type, you can configure the ccc family only.</p> <p>atm-cisco-nlpid—Use Cisco ATM network layer protocol ID (NLPID) encapsulation. When you use this encapsulation type, you can configure the inet family only.</p> <p>atm-mlppp-llc—For ATM2 IQ interfaces only, use Multilink PPP (MLPPP) over AAL5 LLC. For this encapsulation type, your router must be equipped with a Link Services or Voice Services PIC. MLPPP over ATM encapsulation is not supported on ATM2 IQ OC48 interfaces.</p> <p>atm-nlpid—Use ATM NLPID encapsulation. When you use this encapsulation type, you can configure the inet family only.</p> <p>atm-ppp-llc—For ATM2 IQ interfaces only, use PPP over AAL5 LLC encapsulation.</p> <p>atm-ppp-vc-mux—For ATM2 IQ interfaces only, use PPP over ATM AAL5 multiplex encapsulation.</p> <p>atm-snap—Use ATM subnetwork attachment point (SNAP) encapsulation.</p> <p>atm-tcc-snap—Use ATM SNAP encapsulation on translational cross-connect (TCC) circuits.</p> <p>atm-tcc-vc-mux—Use ATM VC multiplex encapsulation on TCC circuits. When you use this encapsulation type, you can configure the tcc family only.</p> <p>atm-vc-mux—Use ATM VC multiplex encapsulation. When you use this encapsulation type, you can configure the inet family only.</p> <p>ether-over-atm-llc—For interfaces that carry IPv4 traffic, use Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure multipoint interfaces.</p>

ether-vpls-over-atm-llc—For ATM2 IQ interfaces only, use the Ethernet virtual private LAN service (VPLS) over ATM LLC encapsulation to bridge Ethernet interfaces and ATM interfaces over a VPLS routing instance (as described in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*). Packets from the ATM interfaces are converted to standard ENET2/802.3 encapsulated Ethernet frames with the frame check sequence (FCS) field removed.

ether-vpls-over-fr—For E1, T1, E3, T3, and SONET interfaces only, use the Ethernet virtual private LAN service (VPLS) over Frame Relay encapsulation to support Bridged Ethernet over Frame Relay encapsulated TDM interfaces for VPLS applications, as per RFC 2427 (1490).

ether-vpls-over-ppp—For E1, T1, E3, T3 and SONET interfaces only, use the Ethernet virtual private LAN service (VPLS) over point-to-point-protocol (PPP) encapsulation to support Bridged Ethernet over PPP encapsulated TDM interfaces for VPLS applications.

ethernet—Use Ethernet II encapsulation (as described in RFC 894, *A Standard for the Transmission of IP Datagrams over Ethernet Networks*).

ethernet-vpls—Use Ethernet VPLS encapsulation on Ethernet interfaces that have VPLS enabled and that must accept packets carrying standard Tag Protocol ID (TPID) values.



NOTE: The built-in Gigabit Ethernet PIC on an M7i router does not support extended VLAN VPLS encapsulation.

frame-relay-ccc—Use Frame Relay encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

frame-relay-ppp—Use PPP over Frame Relay circuits. When you use this encapsulation type, you can configure the **ppp** family only. J Series Routers do not support frame-relay-ppp encapsulation.

frame-relay-tcc—Use Frame Relay encapsulation on TCC circuits for connecting unlike media. When you use this encapsulation type, you can configure the **tcc** family only.

frame-relay-ether-type—Use Frame Relay ether type encapsulation for compatibility with Cisco Frame Relay. The physical interface must be configured with flexible-frame-relay encapsulation.

frame-relay-ether-type-tcc—Use Frame Relay ether type TCC for Cisco-compatible Frame Relay on TCC circuits to connect unlike media. The physical interface must be configured with flexible-frame-relay encapsulation.

multilink-frame-relay-end-to-end—Use MLFR FRF.15 encapsulation. This encapsulation is used only on multilink, link services, voice services interfaces and their constituent T1 or E1 interfaces, and is supported on LSQ and redundant LSQ interfaces.

multilink-ppp—Use MLPPP encapsulation. This encapsulation is used only on multilink, link services, and voice services interfaces and their constituent T1 or E1 interfaces.

ppp-over-ether—For underlying Ethernet interfaces on J Series Services Routers, use PPP over Ethernet encapsulation. When you use this encapsulation type, you cannot configure the interface address. Instead, configure the interface address on the PPP interface. You also use PPP over Ethernet encapsulation to configure an underlying Ethernet interface for a dynamic PPPoE logical interface on M120 and M320 Series routers with Intelligent Queuing 2 (IQ2) PICs, and on MX Series routers with Trio MPC/MIC interfaces.

ppp-over-ether-over-atm-llc—For underlying ATM interfaces on J Series Services Routers only, use PPP over Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure the interface address. Instead, configure the interface address on the PPP interface.

vlan-bridge—Use Ethernet VLAN bridge encapsulation on Ethernet interfaces that have IEEE 802.1Q tagging, flexible-ethernet-services, and bridging enabled and that must accept packets carrying TPID 0x8100 or a user-defined TPID.

vlan-ccc—Use Ethernet virtual LAN (VLAN) encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

vlan-vci-ccc—Use ATM-to-Ethernet interworking encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

vlan-tcc—Use Ethernet VLAN encapsulation on TCC circuits. When you use this encapsulation type, you can configure the **tcc** family only.

vlan-vpls—Use Ethernet VLAN encapsulation on VPLS circuits.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- [Configuring Interface Encapsulation on Logical Interfaces on page 168](#)
- [Circuit and Translational Cross-Connects Overview on page 229](#)
- [Identifying the Access Concentrator](#)
- [Configuring ATM Interface Encapsulation](#)
- [Configuring VLAN Encapsulation](#)
- [Configuring Extended VLAN Encapsulation](#)
- [Configuring ISDN Logical Interface Properties](#)
- [Configuring ATM-to-Ethernet Interworking on page 236](#)
- [Junos OS Services Interfaces Configuration Guide](#)

encapsulation (Physical Interface)

Syntax	<code>encapsulation (atm-ccc-cell-relay atm-pvc cisco-hdlc cisco-hdlc-ccc cisco-hdlc-tcc ethernet-bridge ethernet-ccc ethernet-over-atm ethernet-tcc ethernet-vpls extended-frame-relay-ccc extended-frame-relay-ether-type-tcc extended-frame-relay-tcc extended-vlan-bridge extended-vlan-ccc extended-vlan-tcc extended-vlan-vpls flexible-ethernet-services flexible-frame-relay frame-relay frame-relay-ccc frame-relay-ether-type frame-relay-ether-type-tcc frame-relay-port-ccc frame-relay-tcc multilink-frame-relay-uni-nni ppp ppp-ccc ppp-tcc vlan-ccc vlan-vci-ccc vlan-vpls);</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i>],</code> <code>[edit interfaces <i>rlsnumber:number</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Physical link-layer encapsulation type.
Default	PPP encapsulation.
Options	<p>atm-ccc-cell-relay—Use ATM cell-relay encapsulation.</p> <p>atm-pvc—Use ATM PVC encapsulation.</p> <p>cisco-hdlc—Use Cisco-compatible High-Level Data Link Control (HDLC) framing.</p> <p>cisco-hdlc-ccc—Use Cisco-compatible HDLC framing on CCC circuits.</p> <p>cisco-hdlc-tcc—Use Cisco-compatible HDLC framing on TCC circuits for connecting unlike media.</p> <p>ethernet-bridge—Use Ethernet bridge encapsulation on Ethernet interfaces that have bridging enabled and that must accept all packets.</p> <p>ethernet-ccc—Use Ethernet CCC encapsulation on Ethernet interfaces that must accept packets carrying standard Tag Protocol ID (TPID) values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, CCC is not supported</p> <p>ethernet-over-atm—For interfaces that carry IPv4 traffic, use Ethernet over ATM encapsulation. When you use this encapsulation type, you cannot configure multipoint interfaces. As defined in RFC 1483, <i>Multiprotocol Encapsulation over ATM Adaptation Layer 5</i>, this encapsulation type allows ATM interfaces to connect to devices that support only bridged protocol data units (BPDUs). The Junos OS does not completely support bridging, but accepts BPDU packets as a default gateway. If you use the router as an edge device, then the router acts as a default gateway. It accepts Ethernet LLC/SNAP frames with IP or ARP in the payload, and drops the rest. For packets destined to the Ethernet LAN, a route lookup is done using the destination IP address. If the route lookup yields a full address match, the packet is encapsulated with an LLC/SNAP and MAC header, and the packet is forwarded to the ATM interface.</p>

ethernet-tcc—For interfaces that carry IPv4 traffic, use Ethernet TCC encapsulation on interfaces that must accept packets carrying standard TPID values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, TCC is not supported.

ethernet-vpls—Use Ethernet VPLS encapsulation on Ethernet interfaces that have VPLS enabled and that must accept packets carrying standard TPID values.

extended-frame-relay-ccc—Use Frame Relay encapsulation on CCC circuits. This encapsulation type allows you to dedicate DLCIs 1 through 1022 to CCC.

extended-frame-relay-tcc—Use Frame Relay encapsulation on TCC circuits to connect unlike media. This encapsulation type allows you to dedicate DLCIs 1 through 1022 to TCC.

extended-vlan-bridge—Use extended VLAN bridge encapsulation on Ethernet interfaces that have IEEE 802.1Q VLAN tagging and bridging enabled and that must accept packets carrying TPID 0x8100 or a user-defined TPID.

extended-vlan-ccc—Use extended VLAN encapsulation on CCC circuits with Gigabit Ethernet and 4-port Fast Ethernet interfaces that must accept packets carrying 802.1Q values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, extended VLAN CCC is not supported. For 4-port Gigabit Ethernet PICs, extended VLAN CCC is not supported.

extended-vlan-tcc—For interfaces that carry IPv4 traffic, use extended VLAN encapsulation on TCC circuits with Gigabit Ethernet interfaces on which you want to use 802.1Q tagging. For 4-port Gigabit Ethernet PICs, extended VLAN TCC is not supported.

extended-vlan-vpls—Use extended VLAN VPLS encapsulation on Ethernet interfaces that have VLAN 802.1Q tagging and VPLS enabled and that must accept packets carrying TPIDs 0x8100, 0x9100, and 0x9901.



NOTE: The built-in Gigabit Ethernet PIC on an M7i router does not support extended VLAN VPLS encapsulation.

flexible-ethernet-services—For Gigabit Ethernet IQ interfaces and Gigabit Ethernet PICs with small form-factor pluggable transceivers (SFPs) (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), use flexible Ethernet services encapsulation when you want to configure multiple per-unit Ethernet encapsulations. Aggregated Ethernet bundles can use this encapsulation type. This encapsulation type allows you to configure any combination of route, TCC, CCC, Layer 2 virtual private networks (VPNs), and VPLS encapsulations on a single physical port. If you configure flexible Ethernet services encapsulation on the physical interface, VLAN IDs from 1 through 511 are no longer reserved for normal VLANs.

flexible-frame-relay—For IQ interfaces only, use flexible Frame Relay encapsulation when you want to configure multiple per-unit Frame Relay encapsulations. This encapsulation type allows you to configure any combination of TCC, CCC, and standard Frame Relay encapsulations on a single physical port. Also, each logical interface can have any DLCI value from 1 through 1022.

frame-relay—Use Frame Relay encapsulation.

frame-relay-ccc—Use Frame Relay encapsulation on CCC circuits.

frame-relay-port-ccc—Use Frame Relay port CCC encapsulation to transparently carry all the DLCIs between two customer edge (CE) routers without explicitly configuring each DLCI on the two provider edge (PE) routers with Frame Relay transport. When you use this encapsulation type, you can configure the **ccc** family only.

frame-relay-tcc—Use Frame Relay encapsulation on TCC circuits to connect unlike media.

frame-relay-ether-type—Use Frame Relay ether type encapsulation for compatibility with Cisco Frame Relay.

frame-relay-ether-type-tcc—Use Frame Relay ether type TCC for Cisco-compatible Frame Relay on TCC circuits to connect unlike media.

extended-frame-relay-ether-type-tcc—Use extended Frame Relay ether type TCC for Cisco-compatible Frame Relay for DLCIs 1 through 1022. This encapsulation is used for circuits with different media on either side of the connection.

multilink-frame-relay-uni-nni—Use MLFR UNI NNI encapsulation. This encapsulation is used on link services, voice services interfaces functioning as FRF.16 bundles and their constituent T1 or E1 interfaces, and is supported on LSQ and redundant LSQ interfaces.

ppp—Use serial PPP encapsulation.

ppp-ccc—Use serial PPP encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

ppp-tcc—Use serial PPP encapsulation on TCC circuits for connecting unlike media. When you use this encapsulation type, you can configure the **tcc** family only.

vlan-ccc—Use Ethernet VLAN encapsulation on CCC circuits.

vlan-vci-ccc—Use ATM-to-Ethernet interworking encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only. All logical interfaces configured on the Ethernet interface must also have the encapsulation type set to **vlan-vci-ccc**.

vlan-vpls—Use VLAN VPLS encapsulation on Ethernet interfaces with VLAN tagging and VPLS enabled. Interfaces with VLAN VPLS encapsulation accept packets carrying standard TPID values only.

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Interface Encapsulation on Physical Interfaces on page 116• Defining the Encapsulation for Switching Cross-Connects on page 231• Configuring ATM Interface Encapsulation• Configuring VLAN Encapsulation• Configuring ATM-to-Ethernet Interworking on page 236• Configuring Extended VLAN Encapsulation• Configuring Encapsulation for Layer 2 Wholesale VLAN Interfaces

encoding

Syntax	encoding (nrz nrzi);
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For serial interfaces, set the line encoding format.
Default	The default line encoding is non-return to zero (NRZ).
Options	nrz —Use NRZ line encoding. nrzi —Use non-return to zero inverted (NRZI) line encoding.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Serial Line Encoding on page 287

epd-threshold

See the following sections:

- **epd-threshold (Logical Interface)** on page 428
- **epd-threshold (Physical Interface)** on page 429

epd-threshold (Logical Interface)

Syntax	<code>epd-threshold <i>cells</i> plp1 <i>cells</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	For ATM2 IQ interfaces only, define the early packet discard (EPD) threshold on a VC. The EPD threshold is a limit on the number of transmit packets that can be queued. Packets that exceed the limit are discarded. For interfaces configured in trunk mode, you can also configure dual EPD thresholds depending on the packet loss priorities (PLPs).
Default	Approximately 1 percent of the available cell buffers. If shaping is enabled, the default EPD threshold is proportional to the shaping rate according to the following formula: $\text{default epd-threshold} = \text{number of buffers} * \text{shaping rate} / \text{line rate}$ The minimum EPD threshold value is 48 cells. If the default EPD threshold formula results in an EPD threshold of less than 48 cells, the result will be ignored, and the minimum value of 48 cells will be used.
Options	cells —Maximum number of cells. Range: For 1-port and 2-port OC12 interfaces, 48 through 425,984 cells
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the ATM2 IQ EPD Threshold• Configuring Two EPD Thresholds per Queue

epd-threshold (Physical Interface)

Syntax	<code>epd-threshold <i>cells</i> plp1 <i>cells</i>;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options scheduler-maps <i>map-name</i> forwarding-class <i>class-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define the EPD threshold on a VC. The EPD threshold is a limit on the number of transmit packets that can be queued. Packets that exceed the limit are discarded.
Default	If you do not include either the epd-threshold or the linear-red-profile statement in the forwarding class configuration, the Junos OS uses an EPD threshold based on the available bandwidth and other parameters.
Options	<p>cells—Maximum number of cells.</p> <p>Range: For 1-port and 2-port OC12 interfaces, 48 through 425,984 cells. For 1-port OC48 interfaces, 48 through 425,984 cells. For 2-port OC3, DS3, and E3 interfaces, 48 through 212,992 cells. For 4-port DS3 and E3 interfaces, 48 through 106,496 cells.</p> <p>The plp1 statement is explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring an ATM Scheduler Map linear-red-profile on page 524

es-options

Syntax	<pre>es-options { backup-interface <i>interface-name</i>; }</pre>
Hierarchy Level	[edit interfaces es- <i>fpc/pic/port</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>On ES interfaces, configure ES interface-specific interface properties.</p> <p>The backup-interface statement is explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Junos OS Services Interfaces Configuration Guide

ethernet (Protocols OAM)

```

Syntax  ethernet {
        connectivity-fault-management {
            action-profile profile-name {
                default-actions {
                    interface-down;
                }
            }
        }
        performance-monitoring {
            delegate-server-processing;
            hardware-assisted-timestamping;
            sla-iterator-profiles {
                profile-name {
                    disable;
                    calculation-weight {
                        delay delay-weight;
                        delay-variation delay-variation-weight;
                    }
                    cycle-time milliseconds;
                    iteration-period connections;
                    measurement-type (loss | statistical-frame-loss | two-way-delay);
                }
            }
        }
        linktrace {
            age (30m | 10m | 1m | 30s | 10s);
            path-database-size path-database-size;
        }
        maintenance-domain domain-name {
            level number;
            name-format (character-string | none | dns | mac+2octet);
            maintenance-association ma-name {
                short-name-format (character-string | vlan | 2octet | rfc-2685-vpn-id);
                continuity-check {
                    convey-loss-threshold;
                    hold-interval minutes;
                    interface-status-tlv;
                    interval (10m | 10s | 1m | 1s | 100ms);
                    loss-threshold number;
                    port-status-tlv;
                }
            }
            mep mep-id {
                auto-discovery;
                direction (up | down);
                interface interface-name (protect | working);
                lowest-priority-defect (all-defects | err-xcon | mac-rem-err-xcon | no-defect |
                    rem-err-xcon | xcon );
                priority number;
                remote-mep mep-id {
                    action-profile profile-name;
                    sla-iterator-profile profile-name {
                        data-tlv-size size;
                        iteration-count count-value;
                    }
                }
            }
        }
    }

```

431

```
    evc-map-type (all-to-one-bundling | bundling | service-multiplexing);
    evc evc-name {
        default-evc;
        vlan-list vlan-id-list;
    }
}
}
```

Hierarchy Level [edit protocols oam]

Release Information Statement introduced in Junos OS Release 8.2.

Description For Ethernet interfaces on M320, MX Series, and T Series routers, provide fault signaling and detection for 802.3ah Operation, Administration, and Management (OAM) support.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Enabling IEEE 802.3ah OAM Support
- Example: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers

ethernet-policer-profile

Syntax	<pre> ethernet-policer-profile { input-priority-map { ieee802.1p premium [values]; } output-priority-map { classifier { premium { forwarding-class class-name { loss-priority (high low); } } } } policer cos-policer-name { aggregate { bandwidth-limit bps; burst-size-limit bytes; } premium { bandwidth-limit bps; burst-size-limit bytes; } } } </pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> together-options ethernet-switch-profile], [edit interfaces <i>interface-name</i> aggregated-ether-options ethernet-switch-profile]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For Gigabit Ethernet IQ, 10-Gigabit Ethernet, and Gigabit Ethernet PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), configure a class of service (CoS)-based policer. Policing applies to the inner VLAN identifiers, not to the outer tag. For Gigabit Ethernet interfaces with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), the premium policer is not supported.</p> <p>The statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Gigabit Ethernet Policers

ethernet-ring

Syntax ethernet-ring *ring-name* (
 east-interface {
 control-channel *channel-name* {
 vlan *number*;
 }
 }
 guard-interval *number*;
 node-id *mac-address*;
 restore-interval *number*;
 ring-protection-link-owner;
 west-interface {
 control-channel *channel-name* {
 vlan *number*;
 }
 }
 })
 }

Hierarchy Level [edit protocols protection-group]

Release Information Statement introduced in Junos OS Release 9.4.

Description For Ethernet PICs on MX Series routers, specify the Ethernet ring in an Ethernet ring protection switching configuration.

Options The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

Related Documentation • Ethernet Ring Protection Switching Overview

ethernet-switch-profile

```
Syntax ethernet-switch-profile {
    ethernet-policer-profile {
        input-priority-map {
            ieee802.1p premium [ values ];
        }
        output-priority-map {
            classifier {
                premium {
                    forwarding-class class-name {
                        loss-priority (high | low);
                    }
                }
            }
        }
        policer cos-policer-name {
            aggregate {
                bandwidth-limit bps;
                burst-size-limit bytes;
            }
            premium {
                bandwidth-limit bps;
                burst-size-limit bytes;
            }
        }
        tag-protocol-id tpid;
    }
    (mac-learn-enable | no-mac-learn-enable);
}
```

Hierarchy Level [edit interfaces *interface-name* *gigether-options*],
[edit interfaces *interface-name* *aggregated-ether-options*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For Gigabit Ethernet IQ, 10-Gigabit Ethernet IQ2 and IQ2-E, and Gigabit Ethernet PICs with SFPs (except the 10-port Gigabit Ethernet PIC, aggregated Ethernet with Gigabit Ethernet IQ interfaces, and the built-in Gigabit Ethernet port on the M7i router), configure VLAN tag and MAC address accounting and filtering properties.

The statements are explained separately.



NOTE: When you gather interfaces into a bridge domain, the `no-mac-learn-enable` statement at the [edit interfaces *interface-name* *gigether-options* *ethernet-switch-profile*] hierarchy level is not supported. You must use the `no-mac-learning` statement at the [edit bridge-domains *bridge-domain-name* *bridge-options* interface *interface-name*] hierarchy level to disable MAC learning on an interface in a bridge domain. For information on disabling MAC learning for a bridge domain, see the *MX Series Layer 2 Configuration Guide*.

Default	If the ethernet-switch-profile statement is not configured, Gigabit Ethernet IQ and Gigabit Ethernet PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router) behave like Gigabit Ethernet interfaces.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Gigabit Ethernet Policers• Configuring MAC Address Filtering• Stacking and Rewriting Gigabit Ethernet VLAN Tags Overview

eui-64

Syntax	eui-64;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>number</i> family inet6 address <i>address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.3 for EX Series switches. Statement introduced in Junos OS Release 11.1 for QFX Series switches.
Description	For interfaces that carry IP version 6 (IPv6) traffic, automatically generate the host number portion of interface addresses. Not supported on QFX Series switches.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Interface Address on page 182

evcs

Syntax	<pre>evcs evc-id { evc-protocol cfm management-domain <i>domain-id</i> (management-association <i>association-id</i> vpls (routing-instance <i>instance-id</i>); remote-uni-count <i>count</i>; multipoint-to-multipoint; }</pre>
Hierarchy Level	[edit protocols oam ethernet]
Release Information	Statement introduced in Junos OS Release 9.5.
Description	On MX Series routers with ge , xe , or ae interfaces, configure an OAM Ethernet virtual connection.
Options	<p>evc-protocol cfm vpls—Specify connectivity fault management (CFM) or virtual private LAN service (VPLS) as the Ethernet Virtual Connection (EVC) protocol.</p> <p>management-domain <i>domain-id</i>—(Optional) For CFM, specify the CFM management domain.</p> <p>management-association <i>association-id</i>—(Optional) For CFM, specify the CFM management association.</p> <p>routing-instance <i>instance-id</i>—(Optional) For VPLS, specify the VPLS routing instance.</p> <p>remote-uni-count <i>count</i>—(Optional) Specify the number of remote UNIs in the EVC configuration, the default is 1.</p> <p>multipoint-to-multipoint—(Optional) Specify multiple points in the EVC configuration, the default is point-to-point if remote-uni-count is 1.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Ethernet Local Management Interface lmi (Ethernet OAM) on page 538

event (LFM)

Syntax	<pre>event { link-adjacency-loss; link-event-rate { frame-error <i>count</i>; frame-period <i>count</i>; frame-period-summary <i>count</i>; symbol-period <i>count</i>; } protocol-down; }</pre>
Hierarchy Level	[edit protocols oam ethernet link-fault-management action-profile]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	<p>Configure threshold values for link events in an action profile.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Monitoring Protocol Status

event-thresholds

Syntax	<pre>event-thresholds { frame-error <i>count</i>; frame-period <i>count</i>; frame-period-summary <i>count</i>; symbol-period <i>count</i>; }</pre>
Hierarchy Level	[edit protocols oam link-fault-management interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	<p>Configure threshold limit values for link events in periodic OAM PDUs.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Threshold Values for Local Fault Events on an Interface

f-max-period

Syntax	f-max-period <i>number</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> rtp]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For all adaptive services interfaces and for ISDN interfaces on J Series Services Routers. Specify the maximum number of compressed packets allowed between the transmission of full headers in a compressed Real-Time Transport Protocol (RTP) traffic stream.
Options	<i>number</i> —Maximum number of packets. The value can be from 1 through 65535.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Bandwidth on Demand Junos OS Services Interfaces Configuration Guide

facility-override

Syntax	facility-override <i>facility-name</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> services-options syslog host <i>hostname</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Override default facility for system log reporting.
Options	<i>facility-name</i> —Name of facility that overrides the default assignment.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Junos OS Services Interfaces Configuration Guide

failover-delay

Syntax	<code>failover-delay <i>milliseconds</i>;</code>
Hierarchy Level	[edit protocols vrrp]
Release Information	Statement introduced in Junos OS Release 9.4.
Description	Configure the failover delay for VRRP and VRRP for IPv6 operations.
Options	<i>milliseconds</i> —Specify the failover delay time, in milliseconds. Range: 50 through 2000
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring VRRP and VRRP for IPv6

family

```

Syntax  family family {
        accounting {
            destination-class-usage;
            source-class-usage {
                (input | output | input output);
            }
        }
        access-concentrator name;
        address address {
            ... the address subhierarchy appears after the main [edit interfaces interface-name unit
                logical-unit-number family family-name] hierarchy ...
        }
        bridge-domain-type (bvlan | svlan);
        bundle interface-name;
        core-facing;
        demux-destination {
            destination-prefix;
        }
        demux-source {
            source-prefix;
        }
        duplicate-protection;
        dynamic-profile profile-name;
        filter {
            group filter-group-number;
            input filter-name;
            input-list [ filter-names ];
            output filter-name;
            output-list [ filter-names ];
        }
        interface-mode (access | trunk);
        ipsec-sa sa-name;
        isid-list all-service-groups;
        keep-address-and-control;
        mac-validate (loose | strict);
        max-sessions number;
        mtu bytes;
        multicast-only;
        negotiate-address;
        no-redirects;
        policer {
            arp policer-template-name;
            input policer-template-name;
            output policer-template-name;
        }
        primary;
        protocols [inet iso mpls];
        proxy inet-address address;
        receive-options-packets;
        receive-ttl-exceeded;
        remote (inet-address address | mac-address address);
        rpf-check {

```

```
fail-filter filter-name
mode loose;
}
sampling {
input;
output;
}
service {
input {
post-service-filter filter-name;
service-set service-set-name <service-filter filter-name>;
}
output {
service-set service-set-name <service-filter filter-name>;
}
}
service-name-table table-name
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
unnumbered-address interface-name destination address destination-profile profile-name;
vlan-id number;
vlan-id-list [number number-number];
address address {
arp ip-address (mac | multicast-mac) mac-address <publish>;
broadcast address;
destination address;
destination-profile name;
eui-64;
master-only;
multipoint-destination address dlci dlci-identifier;
multipoint-destination address {
epd-threshold cells;
inverse-arp;
oam-liveness {
up-count cells;
down-count cells;
}
oam-period (disable | seconds);
shaping {
(cbr rate | rtvbr burst length peak rate sustained rate | vbr burst length peak rate
sustained rate);
queue-length number;
}
vci vpi-identifier.vci-identifier;
}
preferred;
primary;
(vrrp-group | vrrp-inet6-group) group-number {
(accept-data | no-accept-data);
advertise-interval seconds;
authentication-type authentication;
authentication-key key;
fast-interval milliseconds;
(preempt | no-preempt) {
hold-time seconds;
}
}
```



```

priority number;
track {
    interface interface-name {
        bandwidth-threshold bits-per-second priority-cost number;
    }
    priority-hold-time seconds;
    route ip-address/prefix-length routing-instance instance-name priority-cost cost;
}
virtual-address [ addresses ];
virtual-link-local-address ipv6-address;
vrrp-inherit-from {
    active-interface interface-name;
    active-group group-number;
}
}
}

```

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure protocol family information for the logical interface.



NOTE: Not all subordinate stanzas are available to every protocol family. See the *Junos OS Configuration Statements and Commands* for details about each protocol family.

Options *family*—Protocol family:

- **any**—Protocol-independent family used for Layer 2 packet filtering
- **bridge**—(M Series and T Series routers only) Configure only when the physical interface is configured with **ethernet-bridge** type encapsulation or when the logical interface is configured with **vlan-bridge** type encapsulation
- **ccc**—Circuit cross-connect protocol suite
- **inet**—Internet Protocol version 4 suite
- **inet6**—Internet Protocol version 6 suite
- **iso**—International Organization for Standardization Open Systems Interconnection (ISO OSI) protocol suite
- **mlfr-end-to-end**—Multilink Frame Relay FRF.15
- **mlfr-uni-nni**—Multilink Frame Relay FRF.16
- **multilink-ppp**—Multilink Point-to-Point Protocol
- **mpls**—Multiprotocol Label Switching (MPLS)
- **pppoe**—Point-to-Point Protocol over Ethernet
- **tcc**—Translational cross-connect protocol suite
- **tnp**—Trivial Network Protocol
- **vpls**—(M Series and T Series routers only) Virtual private LAN service

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

Related Documentation

- Configuring the Protocol Family on page 180
- Example: Configuring E-LINE and E-LAN Services for a PBB Network on MX Series Routers
- [Junos OS Services Interfaces Configuration Guide](#)

fastether-options

Syntax

```
fastether-options {
  802.3ad {
    aex (primary | backup);
    lacp {
      port-priority;
    }
  }
  (flow-control | no-flow-control);
  ignore-l3-incompletes;
  ingress-rate-limit rate;
  (loopback | no-loopback);
  mpls {
    pop-all-labels {
      required-depth number;
    }
  }
  source-address-filter {
    mac-address;
  }
  (source-filtering | no-source-filtering);
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure Fast Ethernet-specific interface properties.


The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Ethernet Interfaces Overview

fcs

Syntax	<code>fcs (16 32);</code>
Hierarchy Level	<code>[edit interfaces e1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces t1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces <i>interface-name</i> ds0-options],</code> <code>[edit interfaces <i>interface-name</i> e1-options],</code> <code>[edit interfaces <i>interface-name</i> e3-options],</code> <code>[edit interfaces <i>interface-name</i> sonet-options],</code> <code>[edit interfaces <i>interface-name</i> t1-options],</code> <code>[edit interfaces <i>interface-name</i> t3-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For E1/E3, SONET/SDH, and T1/T3 interfaces, configure the frame checksum (FCS) on the interface. The checksum must be the same on both ends of the interface.</p> <p>On a channelized OC12 interface, the SONET/SDH fcs statement is not supported. To configure FCS on each DS3 channel, you must include the t3-options fcs statement in the configuration for each channel. For SONET/SDH, the channelized OC12 interface supports DS3 to STS-1 to OC12. For SDH, the channelized OC12 interface supports NxDS3 to NxVC3 to AU3 to STM.</p>
	<div> NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the fcs statement must be included at the <code>[edit interfaces e1-<i>fpc/pic/port</i>]</code> or <code>[edit interfaces t1-<i>fpc/pic/port</i>]</code> hierarchy level as appropriate.</div>
Options	<p>16—Use a 16-bit frame checksum on the interface.</p> <p>32—Use a 32-bit frame checksum on the interface. Using a 32-bit checksum provides more reliable packet verification, but some older equipment might not support 32-bit checksums.</p> <p>Default: 16</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring the E1 Frame Checksum• Configuring the E3 Frame Checksum• Configuring the SONET/SDH Frame Checksum• Configuring the T1 Frame Checksum• Configuring the T3 Frame Checksum

feac-loop-respond

Syntax	(feac-loop-respond no-feac-loop-respond);
Hierarchy Level	[edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For T3 interfaces only, configure the router so a remote CSU can place the local router into loopback.</p> <p>If you configure remote or local loopback with the T3 loopback statement, the router does not respond to FEAC requests from the CSU even if you include the feac-loop-respond statement in the configuration. For the router to respond, you must delete the loopback statement from the configuration.</p> <p>You must rollback the setting done on the remote CSU prior to deactivating the feac-loop-respond statement. If the remote CSU cannot comply, clear the remote loop through local configuration to achieve the cleanup. For example, configure remote loopback on the interface and then delete the remote loopback.</p>
Default	The router does not respond to FEAC requests.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the T3 FEAC Response• loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) on page 549• remote-loopback-respond on page 675

filter

Syntax	<pre>filter { group <i>filter-group-number</i>; input <i>filter-name</i>; input-list [<i>filter-names</i>]; output <i>filter-name</i>; output-list [<i>filter-names</i>]; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Apply a filter to an interface. You can also use filters for encrypted traffic. When you configure filters, you can configure them under the family ethernet-switching , inet , inet6 , mpls , or vpls only.
Options	<p>group <i>filter-group-number</i>—Define an interface to be part of a filter group. The default filter group number is 0.</p> <p>Range: 0 through 255</p> <p>input <i>filter-name</i>—Name of one filter to evaluate when packets are received on the interface.</p> <p>output <i>filter-name</i>—Name of one filter to evaluate when packets are transmitted on the interface.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Applying a Filter to an Interface on page 208• Configuring Firewall Filters (CLI Procedure)• Configuring Gigabit Ethernet Interfaces (CLI Procedure)• Example: Configuring Firewall Filters for Port, VLAN, and Router Traffic on EX Series Switches• Junos OS Services Interfaces Configuration Guide• Junos OS Routing Policy Configuration Guide• Junos OS System Basics Configuration Guide

flexible-vlan-tagging

Syntax	<code>flexible-vlan-tagging;</code>
Hierarchy Level	[edit interfaces <i>ge-fpc/pic/port</i>]
Release Information	Statement introduced in Junos OS Release 8.1.
Description	<p>On M Series and T Series routers, for Fast Ethernet and Gigabit Ethernet interfaces only on Gigabit Ethernet IQ2 and IQ2-E, IQ, and IQE PICs, and for aggregated Ethernet interfaces with member links in IQ2 and IQ2-E PICs or in MX Series DPCs, simultaneously support transmission of 802.1Q VLAN single-tag and dual-tag frames on logical interfaces on the same Ethernet port.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Mixed Tagging

flow-control

Syntax	<code>(flow-control no-flow-control);</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> aggregated-ether-options],</p> <p>[edit interfaces <i>interface-name</i> ether-options],</p> <p>[edit interfaces <i>interface-name</i> fastether-options],</p> <p>[edit interfaces <i>interface-name</i> gigether-options],</p> <p>[edit interfaces <i>interface-name</i> multiservice-options],</p> <p>[edit interfaces interface-range <i>name</i> aggregated-ether-options],</p> <p>[edit interfaces interface-range <i>name</i> ether-options]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 in EX Series switches.</p>
Description	For aggregated Ethernet, Fast Ethernet, and Gigabit Ethernet interfaces only, explicitly enable flow control, which regulates the flow of packets from the router or switch to the remote side of the connection. Enabling flow control is useful when the remote device is a Gigabit Ethernet switch. Flow control is not supported on the 4-port Fast Ethernet PIC.
Default	Flow control is enabled.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Flow Control Configuring Gigabit Ethernet Interfaces (CLI Procedure)

flow-control-options

Syntax	<pre>flow-control-options { down-on-flow-control; dump-on-flow-control; reset-on-flow-control; }</pre>
Hierarchy Level	[edit interfaces <i>mo-fpc/pic/port</i> multiservice-options]
Release Information	Statement introduced before Junos OS Release 8.4.
Description	<p>Configure the flow control options for application recovery in case of a prolonged flow control failure.</p> <ul style="list-style-type: none">• down-on-flow-control—Bring interface down during prolonged flow control.• dump-on-flow-control—Cause core dump during prolonged flow control.• reset-on-flow-control—Reset interface during prolonged flow control.
Usage Guidelines	See Configuring Flow Monitoring.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

force

Syntax	<pre>force (protect working);</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Perform a forced switch between the protect and working circuits. This statement is honored only if there are no higher-priority reasons to switch. It can be overridden by a signal failure on the protect circuit, thus causing a switch to the working circuit.</p>
Options	<p>protect—Request the circuit to become the protect circuit.</p> <p>working—Request the circuit to become the working circuit.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Switching Between the Working and Protect Circuits• request on page 676

forward-and-send-to-re

Syntax	forward-and-send-to-re;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet targeted-broadcast], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet targeted-broadcast]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Specify that IP packets destined for a Layer 3 broadcast address be forwarded to an egress interface and the Routing Engine. The packets are broadcast only if the egress interface is a LAN interface.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Targeted Broadcast on page 227 • Example: Configuring Targeted Broadcast on page 228 • targeted-broadcast on page 741 • Understanding Targeted Broadcast on page 226

forward-only

Syntax	forward-only;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet targeted-broadcast], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet targeted-broadcast]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Specify that IP packets destined for a Layer 3 broadcast address be forwarded to an egress interface only. The packets are broadcast only if the egress interface is a LAN interface.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Targeted Broadcast on page 227 • Example: Configuring Targeted Broadcast on page 228 • targeted-broadcast on page 741 • Understanding Targeted Broadcast on page 226

forwarding-class

See the following sections:

- **forwarding-class (ATM2 IQ Scheduler Maps)** on page 452
- **forwarding-class (Gigabit Ethernet IQ Classifier)** on page 453

forwarding-class (ATM2 IQ Scheduler Maps)

Syntax	<pre>forwarding-class <i>class-name</i> { epd-threshold <i>cells</i> plp1 <i>cells</i>; linear-red-profile <i>profile-name</i>; priority (high low); transmit-weight (<i>cells number</i> percent <i>number</i>); }</pre>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options scheduler-maps <i>map-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define forwarding class name and option values.
Options	<p><i>class-name</i>—Name of forwarding class.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring ATM2 IQ VC Tunnel CoS Components• forwarding-class statement in the <i>Junos OS Class of Service Configuration Guide</i>

forwarding-class (Gigabit Ethernet IQ Classifier)

Syntax	forwarding-class <i>class-name</i> { loss-priority (high low); }
Hierarchy Level	[edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile ethernet-policer-profile output-priority-map classifier premium]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Gigabit Ethernet IQ interfaces only, define forwarding class name and option values.
Options	<i>class-name</i> —Name of forwarding class. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Specifying an Output Priority Map • input-priority-map on page 491 • forwarding-class statement in the <i>Junos OS Class of Service Configuration Guide</i>

forwarding-mode (100-Gigabit Ethernet)

Syntax	forwarding-mode { (sa-multicast ... <i>the following</i> vlan-steering statement...); vlan-steering { vlan-rule (high-low odd-even); } }
Hierarchy Level	[edit chassis fpc <i>slot</i> pic <i>slot</i>]
Release Information	Statement introduced in Junos OS Release 10.4.
Description	Configure the interoperation mode for 100-Gigabit Ethernet PIC. The remaining statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring 100-Gigabit Ethernet PIC VLAN Steering Mode • sa-multicast (100-Gigabit Ethernet) on page 687 • vlan-rule (100-Gigabit Ethernet) on page 795 • vlan-steering (100-Gigabit Ethernet) on page 796

fragment-threshold

Syntax	<code>fragment-threshold bytes;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For multilink, link services, and voice services interfaces, and for J Series Services Routers ISDN interfaces, set the fragmentation threshold.
Options	bytes —Maximum size, in bytes, for multilink packet fragments. Any nonzero value must be a multiple of 64 bytes. Range: 128 through 16,320 bytes Default: 0 bytes (no fragmentation)
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ISDN Logical Interface PropertiesJunos OS Services Interfaces Configuration Guide

frame-error

Syntax	<code>frame-error count;</code>
Hierarchy Level	[edit protocols oam ethernet link-fault-management action-profile event link-event-rate], [edit protocols oam link-fault-management interface <i>interface-name</i> event-thresholds]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	<p>Threshold for sending frame error events or taking the action specified in the action profile.</p> <p>A frame error is any frame error on the underlying physical layer. The threshold is reached when the number of frame errors reaches the configured value within the window. The default window is 100 milliseconds and is not configurable.</p>
Options	<p>count—Threshold count for frame error events.</p> <p>Range: 1 through 100</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring Threshold Values for Local Fault Events on an Interface• Configuring Threshold Values for Fault Events in an Action Profile

frame-period

Syntax	<code>frame-period count;</code>
Hierarchy Level	[edit protocols oam ethernet link-fault-management action-profile event link-event-rate], [edit protocols oam link-fault-management interface <i>interface-name</i> event-thresholds]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	<p>Threshold for sending frame period error events or taking the action specified in the action profile.</p> <p>A frame error is any frame error on the underlying physical layer. The frame period threshold is reached when the number of frame errors reaches the configured value within the period window. The default period window is the number of minimum-size frames that can be transmitted on the underlying physical layer in 1 second. The window is not configurable.</p>
Options	<p>count—Threshold count for frame period error events.</p> <p>Range: 1 through 100</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring Threshold Values for Local Fault Events on an Interface• Configuring Threshold Values for Fault Events in an Action Profile

frame-period-summary


Syntax	<code>frame-period-summary count;</code>
Hierarchy Level	[edit protocols oam ethernet link-fault-management action-profile event link-event-rate], [edit protocols oam link-fault-management interface <i>interface-name</i> event-thresholds]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	<p>Threshold for sending frame period summary error events or taking the action specified in the action profile.</p> <p>An errored frame second is any 1-second period that has at least one errored frame. This event is generated if the number of errored frame seconds is equal to or greater than the specified threshold for that period window. The default window is 60 seconds. The window is not configurable.</p>
Options	<p>count—Threshold count for frame period summary error events.</p> <p>Range: 1 through 100</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring Threshold Values for Local Fault Events on an Interface• Configuring Threshold Values for Fault Events in an Action Profile

framing

See the following sections:

- **framing (E1, E3, and T1 Interfaces) on page 459**
- **framing (10-Gigabit Ethernet Interfaces) on page 460**
- **framing (SONET and SDH Interfaces) on page 460**

framing (E1, E3, and T1 Interfaces)

Syntax	<code>framing (g704 g704-no-crc4 g.751 g.832 unframed sf esf);</code>
Hierarchy Level	<code>[edit interfaces ce1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces ct1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces at-<i>fpc/pic/port</i> e3-options],</code> <code>[edit interfaces e1-<i>fpc/pic/port</i> e1-options],</code> <code>[edit interfaces t1-<i>fpc/pic/port</i> t1-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the framing format.
	<div>  <p>NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the framing statement must be included at the <code>[edit interfaces ce1-<i>fpc/pic/port</i>]</code> or <code>[edit interfaces ct1-<i>fpc/pic/port</i>]</code> hierarchy level as appropriate.</p> </div>
Default	esf for T1 interfaces; g704 for E1 interfaces. There is no default value for E3 over ATM interfaces.
Options	<p>esf—Extended superframe (ESF) mode for T1 interfaces.</p> <p>g704—G.704 framing format for E1 interfaces.</p> <p>g704-no-crc4—G.704 framing with no cyclic redundancy check 4 (CRC4) for E1 interfaces.</p> <p>g.751—G.751 framing format for E3 over ATM interfaces.</p> <p>g.832—G.832 framing format for E3 over ATM interfaces.</p> <p>sf—Superframe (SF) mode for T1 interfaces.</p> <p>unframed—Unframed mode for E1 interfaces.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring E1 Framing Configuring E3 and T3 Parameters on ATM Interfaces Configuring T1 Framing

framing (10-Gigabit Ethernet Interfaces)

Syntax	<code>framing (lan-phy wan-phy);</code>
Hierarchy Level	<code>[edit interfaces xe-fpc/pic/port]</code>
Release Information	Statement introduced in Junos OS Release 8.0.
Description	For routers supporting the 10-Gigabit Ethernet interface, configure the framing format. WAN PHY mode is supported on MX240, MX480, MX960, T640, and T1600 routers only.
Default	Operates in LAN PHY mode.
Options	lan-phy —10GBASE-R interface framing format that bypasses the WIS sublayer to directly stream block-encoded Ethernet frames on a 10-Gigabit Ethernet serial interface. wan-phy —10GBASE-W interface framing format that allows 10-Gigabit Ethernet wide area links to use fiber-optic cables and SONET devices.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">10-Gigabit Ethernet Framing OverviewConfiguring SONET Options for 10-Gigabit Ethernet Interfaces

framing (SONET and SDH Interfaces)

Syntax	<code>framing (sdh sonet);</code>
Hierarchy Level	<code>[edit interfaces so-fpc/pic/port]</code>
Release Information	Statement introduced in Junos OS Release 8.1.
Description	For the 4-port OC48 PIC with SFP installed and the 4-port OC192 PIC in T Series and M Series routers, configure SONET or SDH framing on a per-port basis. This functionality allows you to mix SONET and SDH modes on interfaces on the same PIC.
Options	sdh —SDH framing. sonet —SONET framing.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring SONET/SDH Framing

gigether-options

```
Syntax  gigether-options {
        802.3ad {
            aex (primary | backup);
            lacp {
                port-priority;
            }
        }
        (asynchronous-notification | no-asynchronous-notification);
        (auto-negotiation | no-auto-negotiation) remote-fault <local-interface-online |
        local-interface-offline>;
        (flow-control | no-flow-control);
        ignore-l3-incompletes;
        (loopback | no-loopback);
        mpls {
            pop-all-labels {
                required-depth number;
            }
        }
        no-auto-mdix
        source-address-filter {
            mac-address;
        }
        (source-filtering | no-source-filtering);
        speed
        ethernet-switch-profile {
            (mac-learn-enable | no-mac-learn-enable);
            tag-protocol-id [ tpids ];
            ethernet-policer-profile {
                input-priority-map {
                    ieee802.1p premium [ values ];
                }
                output-priority-map {
                    classifier {
                        premium {
                            forwarding-class class-name {
                                loss-priority (high | low);
                            }
                        }
                    }
                }
            }
            policer cos-policer-name {
                aggregate {
                    bandwidth-limit bps;
                    burst-size-limit bytes;
                }
                premium {
                    bandwidth-limit bps;
                    burst-size-limit bytes;
                }
            }
        }
    }
```

}

Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure Gigabit Ethernet specific interface properties. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Ethernet Interfaces Overview

gratuitous-arp-reply

Syntax	(gratuitous-arp-reply no-gratuitous-arp-reply);
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 in EX Series switches.
Description	For Ethernet interfaces, enable updating of the ARP cache for replies received in response to gratuitous ARP requests.
Default	Updating of the ARP cache is disabled on all Ethernet interfaces.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Gratuitous ARP• no-gratuitous-arp-request on page 592

guard-interval

Syntax	<code>guard-interval <i>number</i>;</code>
Hierarchy Level	<code>[edit protocols protection-group ethernet-ring <i>ring-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 9.4.
Description	Specify the guard timer interval in 10 millisecond (ms) intervals.
Options	<p><i>number</i>—Guard timer interval, in milliseconds.</p> <p>Range: 10 through 2000 ms</p> <p>Default: 500 ms</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Ethernet Ring Protection Switching Overview

hardware-assisted-timestamping

Syntax	<code>hardware-assisted-timestamping;</code>
Hierarchy Level	<code>[edit protocols oam ethernet connectivity-fault-management performance-monitoring]</code>
Release Information	Statement introduced in Junos OS Release 9.5.
Description	<p>For Ethernet interfaces on Enhanced and Enhanced Queuing Dense Port Concentrators (DPCs) in MX Series routers only, enable hardware-assisted timestamping support for Ethernet frame delay measurement.</p> <p>By default, the ETH-DM feature calculates frame delays using software-based timestamping of the ETH-DM PDU frames sent and received by the MEPs in the session. As an option that can increase the accuracy of ETH-DM calculations when the DPC is loaded with heavy traffic in the receive direction, you can enable hardware-assisted timestamping of session frames in the receive direction.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Ethernet Frame Delay Measurements Overview Guidelines for Configuring Routers to Support an ETH-DM Session Enabling the Hardware-Assisted Timestamping Option

hello-timer

Syntax	hello-timer <i>milliseconds</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For link services and voice services interfaces only, configure the rate at which hello messages are sent. A hello message is transmitted after a period defined in milliseconds has elapsed.
Options	milliseconds —The rate at which hello messages are sent. Range: 1 through 180 milliseconds Default: 10 milliseconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide• acknowledge-timer on page 299• address on page 306

hierarchical-policer

Syntax	<pre> hierarchical-policer <i>name</i> { aggregate { if-exceeding { bandwidth-limit <i>bandwidth</i>; burst-size-limit <i>burst</i>; } then { discard; } } premium { if-exceeding { bandwidth-limit <i>bandwidth</i>; burst-size-limit <i>burst</i>; } then { discard; } } } </pre>
Hierarchy Level	[edit firewall]
Release Information	Statement introduced in Junos OS Release 9.5.
Description	For M40e, M120, and M320 (with FFPC and SFPC) edge routers and T320, T640, and T1600 core routers with Enhanced Intelligent Queuing (IQE) PICs, specify a hierarchical policer.
Options	Options are described separately.
Required Privilege Level	firewall—To view this statement in the configuration. firewall-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Applying Policers on page 199 Junos OS Class of Service Configuration Guide

hierarchical-schedulers

Syntax	hierarchical-schedulers { maximum-hierarchy-levels <i>number</i> ; }
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 10.1.
Description	On MX Series routers with Trio MPC/MICs, configure the parameters for hierarchical scheduling on the interface.
Default	If you do not include this statement, the system uses default hierarchical scheduler parameters.
Options	maximum-hierarchical-levels <i>number</i> —The maximum number of hierarchical scheduling levels allowed for node scaling. The only supported value is 2.
Required Privilege Level	view-level—To view this statement in the configuration. control-level—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Class of Service Configuration Guide• hierarchical-scheduler

high-plp-max-threshold

Syntax	high-plp-max-threshold <i>percent</i> ;
Hierarchy Level	[edit interfaces <i>at-fpc/pic/port</i> atm-options linear-red-profiles <i>profile-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define the drop profile fill-level for the high PLP CoS VC. When the fill level exceeds the defined percentage, all packets are dropped.
Options	<i>percent</i> —Fill-level percentage when linear random early discard (RED) is applied to cells with PLP.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring ATM2 IQ VC Tunnel CoS Components• low-plp-max-threshold on page 553• low-plp-threshold on page 554• queue-depth on page 663

high-plp-threshold

Syntax	<code>high-plp-threshold percent;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options linear-red-profiles <i>profile-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define CoS VC drop profile fill-level percentage when linear RED is applied to cells with high PLP. When the fill level exceeds the defined percentage, packets with high PLP are randomly dropped by RED. This statement is mandatory.
Options	percent —Fill-level percentage when linear RED is applied to cells with PLP.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring ATM2 IQ VC Tunnel CoS Components• high-plp-max-threshold on page 466• low-plp-max-threshold on page 553• low-plp-threshold on page 554• queue-depth on page 663

hold-interval

See the following sections:

- **hold-interval (OAM)** on page 468
- **hold-interval (Protection Group)** on page 468

hold-interval (OAM)

Syntax	<code>hold-interval <i>minutes</i>;</code>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>domain-name</i> maintenance-association <i>ma-name</i> continuity-check]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	The time to wait before flushing the maintenance end point (MEP) database, if no updates occur.
Options	<i>minutes</i> —Time to wait, in minutes.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Continuity Check Protocol

hold-interval (Protection Group)

Syntax	<code>hold-interval <i>number</i>;</code>
Hierarchy Level	[edit protocols protection-group ethernet-ring <i>name</i>]
Release Information	Statement introduced in Junos OS Release 9.4.
Description	Specify the hold-off timer interval <i>for all rings</i> in 100 millisecond (ms) increments.
Options	<i>number</i> —Hold-timer interval, in milliseconds. Range: 0 through 10,000 ms Default: 100 ms
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Ethernet Ring Protection Switching Overview

hold-time

See the following sections:

- **hold-time (APS) on page 469**
- **hold-time (Physical Interface) on page 470**
- **hold-time (SONET/SDH Defect Triggers) on page 471**




NOTE: For information about the hold-time statement at the [edit interfaces *interface-name* unit *logical-unit-number* family (inet | inet6) address *address* (vrrp-group | vrrp-inet6-group) *group-number* preempt] and [edit logical-systems *logical-system-name* interface *interface-name* unit *logical-unit-number* family (inet | inet6) address *address* (vrrp-group | vrrp-inet6-group) *group-number* preempt], see the [Junos OS High Availability Configuration Guide](#).


hold-time (APS)

Syntax	<code>hold-time <i>milliseconds</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Hold-time value to use to determine whether a neighbor APS router is operational.
Options	<p><i>milliseconds</i>—Hold-time value.</p> <p>Range: 1 through 65,534 milliseconds</p> <p>Default: 3000 milliseconds (3 times the advertisement interval)</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring APS Timers • advertise-interval on page 307

hold-time (Physical Interface)

Syntax	hold-time up <i>milliseconds</i> down <i>milliseconds</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 11.1 for the QFX Series.
Description	Hold-time value to use to damp interface transitions. When an interface goes from up to down, it is not advertised to the rest of the system as being down until it has remained down for the hold-time period. Similarly, an interface is not advertised as being up until it has remained up for the hold-time period.
	<div> NOTE: The hold-time option is not available for controller interfaces.</div>
Default	Interface transitions are not damped.
Options	<p>down <i>milliseconds</i>—Hold time to use when an interface transitions from up to down. The Junos OS advertises the transition within 100 milliseconds of the time value you specify.</p> <p>Range: 0 through 4,294,967,295 milliseconds</p> <p>Default: 0 milliseconds (interface transitions are not damped)</p> <p>up <i>milliseconds</i>—Hold time to use when an interface transitions from down to up. The Junos OS advertises the transition within 100 milliseconds of the time value you specify.</p> <p>Range: 0 through 4,294,967,295 milliseconds</p> <p>Default: 0 milliseconds (interface transitions are not damped)</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Damping Interface Transitions on page 147• advertise-interval on page 307

hold-time (SONET/SDH Defect Triggers)

Syntax	<code>hold-time up <i>milliseconds</i> down <i>milliseconds</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options trigger defect]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM over SONET/SDH and SONET/SDH interfaces only, apply up and down hold times to SONET/SDH defect triggers. When you apply a down hold time to a defect, the defect must remain present for at least the hold-time period before the interface is marked down. When you apply an up hold time to a defect, the defect must remain absent for at least the hold-time period before the interface is marked up, assuming no other defect is outstanding.
	<div>  <p>NOTE: On M Series and T Series platforms with Channelized SONET IQ PICs and Channelized SONET IQE PICs, the SONET defect alarm trigger hold-time statement is not supported.</p> </div>
Default	If you do not include this statement, when a defect is detected the interface is marked down immediately, and when the defect becomes absent the interface is marked up immediately.
Options	<p>down <i>milliseconds</i>—Hold time to wait before the interface is marked down. Range: 1 through 65,534 milliseconds Default: No hold time</p> <p>up <i>milliseconds</i>—Hold time to wait before the interface is marked up. Range: 1 through 65,534 milliseconds Default: No hold time</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring SONET/SDH Defect Hold Times

host

Syntax	<pre>host <i>hostname</i> { facility-override; log-prefix <i>prefix-number</i>; services <i>priority-level</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> services-options syslog]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify hostname for system logging utility.
Options	<p><i>hostname</i>—Name of system logging utility host machine.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

idle-cycle-flag

Syntax	<code>idle-cycle-flag <i>value</i>;</code>
Hierarchy Level	<code>[edit interfaces e1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces t1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces <i>interface-name</i> ds0-options],</code> <code>[edit interfaces <i>interface-name</i> e1-options],</code> <code>[edit interfaces <i>interface-name</i> e3-options],</code> <code>[edit interfaces <i>interface-name</i> serial-options],</code> <code>[edit interfaces <i>interface-name</i> t1-options],</code> <code>[edit interfaces <i>interface-name</i> t3-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the value that the DS0, E1, E3, T1, or T3 interface transmits during idle cycles.



NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the `idle-cycle-flag` statement must be included at the `[edit interfaces e1-fpc/pic/port]` or `[edit interfaces t1-fpc/pic/port]` hierarchy level as appropriate.

Options	<p><i>value</i>—Value to transmit in the idle cycles:</p> <ul style="list-style-type: none"> flags—Transmit the value 0x7E. ones—Transmit the value 0xFF (all ones). <p>Default: <code>Flags</code></p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring the E1 Idle Cycle Flag Configuring the E3 Idle Cycle Flag Configuring the T1 Idle Cycle Flag Configuring the T3 Idle Cycle Flag

idle-timeout

Syntax	<code>idle-timeout seconds;</code>
Hierarchy Level	<code>[edit interfaces <i>dl</i>n unit <i>logical-unit-number</i> dialer-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	On J Series Services Routers with ISDN interfaces, configure the number of seconds the link is idle before losing connectivity.
Options	seconds —Time for which the connection can remain idle. For interfaces configured to use a filter for traffic, the idle timeout is based on traffic. Range: 1 through 429497295 Default: 120 seconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ISDN Logical Interface Properties<i>Junos OS Interfaces and Routing Configuration Guide</i>

ieee802.1p

Syntax	<code>ieee802.1p premium [<i>values</i>];</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile <i>ethernet-policer-profile</i> input-priority-map]</code>
Release Information	Statement introduced before JUNOS Release 7.4.
Description	For Gigabit Ethernet IQ and 10-Gigabit Ethernet interfaces only, configure premium priority values for IEEE 802.1p input traffic.
Options	values —Define IEEE 802.1p priority values to be treated as premium. Range: 0 through 7
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Specifying an Input Priority Map

if-exceeding

Syntax	if-exceeding { bandwidth-limit <i>bandwidth</i> ; burst-size-limit <i>burst</i> ; }
Hierarchy Level	[edit firewall hierarchical-policer aggregate], [edit firewall hierarchical-policer premium]
Release Information	Statement introduced in Junos OS Release 9.5.
Description	For M40e, M120, and M320 (with FFPC and SFPC) edge routers and T320, T640, and T1600 core routers with Enhanced Intelligent Queuing (IQE) PICs, specify bandwidth and burst limits for an aggregate level of a hierarchical policer.
Options	Options are described separately.
Required Privilege Level	firewall—To view this statement in the configuration. firewall-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Applying Policers on page 199Junos OS Class of Service Configuration Guide

igmp-snooping

Syntax

```
igmp-snooping {
  immediate-leave;
  interface interface-name {
    group-limit limit;
    host-only-interface;
    immediate-leave;
    multicast-router-interface;
    static {
      group ip-address {
        source ip-address;
      }
    }
  }
  proxy {
    source-address ip-address;
  }
  query-interval seconds;
  query-last-member-interval seconds;
  query-response-interval seconds;
  robust-count number;
  vlan vlan-id {
    immediate-leave;
    interface interface-name {
      group-limit limit;
      host-only-interface;
      immediate-leave;
      multicast-router-interface;
      static {
        group ip-address {
          source ip-address;
        }
      }
    }
  }
  proxy {
    source-address ip-address;
  }
  query-interval seconds;
  query-last-member-interval seconds;
  query-response-interval seconds;
  robust-count number;
}
```

Hierarchy Level [edit bridge-domains *bridge-domain-name* protocols],
[edit routing-instances *routing-instance-name* bridge-domains *bridge-domain-name* protocols]

Release Information Statement introduced in Junos OS Release 8.5.

Description Enable IGMP snooping on the router.

Default IGMP snooping is disabled on the router.

Options	The statements are explained separately.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Introduction to IGMP Snooping• IGMP Snooping in MC-LAG Active-Active on MX Series Routers Overview

ignore

Syntax	ignore;
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options trigger defect]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM over SONET/SDH and SONET/SDH interfaces only, ignore a specific SONET/SDH defect trigger.
Default	If you do not include this statement, all defects are honored with no hold time.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring SONET/SDH Defect Triggers to Be Ignored• hold-time (Physical Interface) on page 470

ignore-all

Syntax	ignore-all;
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options dce-options], [edit interfaces <i>interface-name</i> serial-options dte-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Ignore all control leads. You can include the ignore-all statement in the configuration only if you do not explicitly enable other signal handling options at the dte-options hierarchy level.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Serial Signal Handling on page 281

ignore-l3-incompletes

Syntax	ignore-l3-incompletes;
Hierarchy Level	[edit interfaces <i>interface-name</i> fastether-options], [edit interfaces <i>interface-name</i> ggether-options]
Release Information	Statement introduced in Junos OS Release 9.0.
Description	Ignore the counting of Layer 3 incomplete errors on Fast Ethernet, Gigabit Ethernet, and 10-Gigabit Ethernet interfaces.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Ignoring Layer 3 Incomplete Errors

ilmi

Syntax	ilmi;
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Enable the router to communicate with directly attached ATM switches and routers. The router uses the VC 0.16 to communicate with the ATM switch or router. Once configured, you can display the IP address and port number of an ATM switch or router using the show interfaces <i>interface-name</i> switch-id command.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Communication with Directly Attached ATM Switches and Routersshow ilmishow ilmi statistics

ima-group-options

Syntax

```
ima-group-options {
    differential-delay number;
    frame-length (32 | 64 | 128 | 256);
    frame-synchronization {
        alpha number;
        beta number;
        gamma number;
    }
    minimum-links number;
    symmetry (symmetrical-config-and-operation |
        symmetrical-config-asymmetrical-operation);
    test-procedure {
        ima-test-start;
        ima-test-stop;
        interface name;
        pattern number;
        period number;
    }
    transmit-clock (common | independent);
    version (1.0 | 1.1);
}
```

Hierarchy Level [edit interfaces (t1-fpc/pic/port:m:n | e1-fpc/pic/port:n | t1|e1-fpc/pic/port)]

Release Information Statement introduced in Junos OS Release 10.0.

Description Specify IMA group options.

Options

- differential-delay 1–56**—Maximum differential delay among links in msec, the default is 25.
- frame-length (32 | 64 | 128 | 256)**—IMA frame length in number of cells; default is 128.
- frame-synchronization**—IMA group frame synchronization selection.
 - alpha 1–2**—Number of consecutive invalid ICP cells for IFSM, the default is 2.
 - beta 1–2**—Number of consecutive errored ICP cells for IFSM, the default is 2.
 - gamma 1–5**—Number of consecutive valid ICP cells for IFSM, the default is 1.
- minimum-links 1–8**—IMA group minimum active links; the default is 1.
- symmetry (symmetrical-config-and-operation | symmetrical-config-asymmetrical-operation)**—IMA group symmetry mode selection.
- test-procedure**—Specify an IMA link interface test.
 - ima-test-start**—Start IMA group test.
 - ima-test-stop**—Stop IMA group test.
 - interface *name***—Interface name of the IMA link to test.

pattern 1–254—IMA test pattern, default is 170.

period 1–4294967294—Length of IMA pattern test in seconds, the default is 10.

transmit-clock (common |independent)—Transmit clock configuration; the default is common.

version (1.0 |1.1)—IMA specification version.

Required Privilege Level	interface—To view this statement in the configuration.
	interface-control—To add this statement to the configuration.
Related Documentation	• ATM Support on Circuit Emulation PICs Overview
	• ima-link-options on page 480

ima-link-options

Syntax	ima-link-options group <i>g</i>
Hierarchy Level	[edit interfaces (t1- <i>fpc/pic/port:m:n</i> e1- <i>fpc/pic/port:n</i> t1 e1- <i>fpc/pic/port</i>)]
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Specify an interface as a member of an IMA group.
Options	group <i>g</i> —Implying at-x/y/g.
Required Privilege Level	interface—To view this statement in the configuration.
	interface-control—To add this statement to the configuration.
Related Documentation	• ATM Support on Circuit Emulation PICs Overview
	• ima-group-options on page 479


inactivity-timeout

Syntax	<code>inactivity-timeout <i>seconds</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> services-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For adaptive services interfaces, configure the inactivity timeout period for established flows. The timeout configured in the application protocol definition overrides this value.
Options	<p><i>seconds</i>—Timeout period, in seconds.</p> <p>Range: 4 through 86,400 seconds</p> <p>Default: 30 seconds</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Junos OS Services Interfaces Configuration Guide

incoming-called-number

Syntax	<code>incoming-called-number <i>number</i> <reject>;</code>
Hierarchy Level	[edit interfaces br-pim/0/port isdn-options]
Release Information	Statement introduced on Junos OS Release 7.5.
Description	On J Series Services Routers with interfaces configured for ISDN, screen incoming calls. If the incoming number is configured, the call is accepted. If the reject option is specified with the number, the call is rejected. If no numbers are configured, all calls are accepted.
Options	<p><i>number</i>—(Optional) Incoming caller number. Multiple numbers can be configured, up to a maximum of 30 entries. Only a precise match is a valid match. For example, the configured caller number 1-222-333-4444 or 222-333-4444 will match the incoming caller number 1-222-333-4444.</p> <p>reject—(Optional) Rejects the incoming number.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring an ISDN Interface to Screen Incoming Calls • Junos OS Services Interfaces Configuration Guide

incoming-map

Syntax	<pre>incoming-map { caller <i>caller-number</i> accept-all; }</pre>
Hierarchy Level	[edit interfaces <i>dl</i> n unit <i>logical-unit-number</i> dialer-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>dl</i> n unit <i>logical-unit-number</i> dialer-options]
Release Information	Statement introduced in Junos OS Release 7.5.
Description	<p>On J Series Services Routers with interfaces configured for ISDN, specify the dialer to accept incoming calls.</p> <p>The statements are explained separately.</p>
	<div> NOTE: The <code>incoming-map</code> statement is mandatory for the router to accept any incoming ISDN calls.</div>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Dial-In and Callback<i>Junos OS Interfaces and Routing Configuration Guide</i>

indication

Syntax	indication (ignore normal require);
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options dce-options], [edit interfaces <i>interface-name</i> serial-options dte-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For X.21 interfaces only, configure the from-DCE signal indication.
Options	<p>ignore—The from-DCE signal is ignored.</p> <p>normal—Normal indication signal handling as defined by ITU-T Recommendation X.21.</p> <p>require—The from-DCE signal must be asserted.</p> <p>Default: normal</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring the Serial Signal Handling on page 281

indication-polarity

Syntax	indication-polarity (negative positive);
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For X.21 interfaces only, configure the indication signal polarity.
Options	<p>positive—Positive signal polarity.</p> <p>negative—Negative signal polarity.</p> <p>Default: positive</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Serial Signal Polarities on page 284

ingress-rate-limit

Syntax	<code>ingress-rate-limit <i>rate</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> fastether-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Perform port-based rate limiting on ingress traffic arriving on Fast Ethernet 8-port, 12-port, and 48-port PICs.
Options	rate —Traffic rate, in megabits per second (Mbps). Range: 1 through 100 Mbps
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the Ingress Rate Limit

init-command-string

Syntax	<code>init-command-string <i>initialization-command-string</i>;</code>
Hierarchy Level	<code>[edit interfaces umd0 modem-options]</code>
Release Information	Statement introduced in Junos OS Release 8.2.
Description	<p>For J Series Services Routers, configure the command string used to initialize the USB modem.</p> <p>When you connect the USB modem to the USB port on a Services Router, the router applies the modem AT commands configured in the init-command-string command to the initialization commands on the modem.</p> <p>For example, the initialization command string ATS0 = 2\n configures the USB modem to pick up a call after 2 rings.</p> <p>If you do not include the init-command-string statement, the router applies the default initialization string to the modem.</p>
Options	<p><i>initialization-command-string</i>—Specify an initialization command string using the following AT command values:</p> <ul style="list-style-type: none"> • %C0—Disables data compression. • &C1—Disables reset of the modem when it loses the carrier signal. • &Q8—Enables Microcom Networking Protocol (MNP) error control mode. • AT—Attention. Informs the modem that a command follows. • E0—Disables the display on the local terminal of commands issued to the modem from the local terminal. • Q0—Enables the display of result codes. • S0=0—Disables the auto-answer feature, whereby the modem automatically answers calls. • S7=45—Instructs the modem to wait 45 seconds for a telecommunications service provider (carrier) signal before terminating the call. • V1—Displays result codes as words. <p>Default: <code>AT S7=45 S0=0 V1 X4 &C1 E0 Q0 &Q8 %C0</code></p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Specifying a USB Modem Interface on J Series Routers on page 102

initial-route-check

Syntax	<code>initial-route-check seconds;</code>
Hierarchy Level	[edit interfaces <i>dl</i> unit <i>logical-unit-number</i> dialer-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	On J Series Services Routers with ISDN interfaces, allows the router to check whether the primary route is up after the initial startup of the router is complete and the timer expires.
Options	seconds —How long to wait to check if the primary interface is up after the router comes up. Range: 1 through 300 seconds Default: 120 seconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• ISDN Interfaces Overview• <i>Junos OS Interfaces and Routing Configuration Guide</i>

inner-tag-protocol-id

Syntax	<code>inner-tag-protocol-id <i>tpid</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map]
Release Information	Statement introduced in Junos OS Release 8.1.
Description	For Gigabit Ethernet IQ, IQ2 and IQ2-E interfaces, and for aggregated Ethernet interfaces using Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet PICs on MX Series routers, configure the IEEE 802.1Q TPID value to rewrite for the inner tag. All TPIDs you include in input and output VLAN maps must be among those you specify at the [edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile tag-protocol-id [<i>tpids</i>]] hierarchy level.
Default	If the inner-tag-protocol-id statement is not configured, the TPID value is 0x8100.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Inner and Outer TPIDs and VLAN IDs

inner-vlan-id

Syntax	<code>inner-vlan-id <i>number</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map]
Release Information	Statement introduced in Junos OS Release 8.1.
Description	<p>For Gigabit Ethernet IQ, IQ2 and IQ2-E interfaces, and for aggregated Ethernet interfaces using Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet PICs on MX Series routers, specify the VLAN ID to rewrite for the inner tag of the final packet.</p> <p>You cannot include the inner-vlan-id statement with the swap statement, swap-push statement, push-push statement, or push-swap statement and the inner-vlan-id statement at the [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map] hierarchy level. If you include any of those statements in the output VLAN map, the VLAN ID in the outgoing frame is rewritten to the inner-vlan-id statement you include at the [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>] hierarchy level.</p>
Options	<p><i>number</i>—VLAN ID number.</p> <p>Range: 0 through 4094</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">Configuring Inner and Outer TPIDs and VLAN IDs

inner-vlan-id-range

Syntax	<code>inner-vlan-id-range start <i>start-id</i> end <i>end-id</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],
Release Information	Statement introduced in Junos OS Release 9.0.
Description	The range of VLAN IDs to be used in the ATM-to-Ethernet interworking cross-connect. Specify the starting VLAN ID and ending VLAN ID.
Options	start-id —The lowest VLAN ID to be used. end-id —The highest VLAN ID to be used. Range: 32 through 4094
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring ATM-to-Ethernet Interworking on page 236

input

Syntax	<pre>input { service-set <i>service-set-name</i> <service-filter <i>filter-name</i>>; post-service-filter <i>filter-name</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet service], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet service]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Define one or more input service sets and filters, and one postservice filter to be applied to traffic.
Options	The remaining statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Junos OS Services Interfaces Configuration Guide

input-list

Syntax	<code>input-list [<i>filter-names</i>];</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> filter], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> filter]
Release Information	Statement introduced in Junos OS Release 7.6.
Description	Apply a group of filters to evaluate when packets are received on an interface.
Options	[<i>filter-names</i>]—Name of a filter to evaluate when packets are received on the interface. Up to 16 filters can be included in a filter input list.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Applying a Filter to an Interface on page 208• Junos OS Routing Policy Configuration Guide• Junos OS System Basics Configuration Guide• output-list on page 609

input-policer

Syntax	<code>input-policer <i>policer-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> layer2-policer]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	Associate a Layer 2 policer with a logical interface. The <code>input-policer</code> and <code>input-three-color</code> statements are mutually exclusive.
Options	<i>policer-name</i> —Name of the policer that you define at the [edit firewall] hierarchy level.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Applying a Policer• output-policer on page 609

input-priority-map

Syntax	input-priority-map { ieee802.1p premium [<i>values</i>]; }
Hierarchy Level	[edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile ethernet-policer-profile]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Gigabit Ethernet IQ and 10-Gigabit Ethernet interfaces only, define the input policer priority map to be applied to incoming frames on this interface. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Specifying an Input Priority Map output-priority-map on page 610

input-three-color

Syntax	input-three-color <i>policer-name</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> layer2-policer]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	Associate a Layer 2, three-color policer with a logical interface. The input-three-color and input-policer statements are mutually exclusive.
Options	<i>policer-name</i> —Name of the three-color policer that you define at the [edit firewall] hierarchy level.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Applying a Policer output-three-color on page 610

input-vlan-map

See the following sections:

- [input-vlan-map \(Aggregated Ethernet\)](#) on page 492
- [input-vlan-map \(Gigabit Ethernet IQ and 10-Gigabit Ethernet SFPP\)](#) on page 493

input-vlan-map (Aggregated Ethernet)

Syntax	<pre>input-vlan-map { (pop push swap); tag-protocol-id <i>tpid</i>; vlan-id <i>number</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	<p>For aggregated Ethernet interfaces using Gigabit Ethernet IQ and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces only, define the rewrite profile to be applied to incoming frames on this logical interface.</p> <p>The statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Stacking a VLAN Tag• output-vlan-map (Aggregated Ethernet) on page 611

input-vlan-map (Gigabit Ethernet IQ and 10-Gigabit Ethernet SFPP)

Syntax	<pre>input-vlan-map { (pop pop-pop pop-swap push push-push swap swap-push swap-swap); inner-tag-protocol-id <i>tpid</i>; inner-vlan-id <i>number</i>; tag-protocol-id <i>tpid</i>; vlan-id <i>number</i>; }</pre>
Hierarchy Level	<pre>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]</pre>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>pop-pop, pop-swap, push-push, swap-push, and swap-swap statements introduced in Junos OS Release 8.1.</p>
Description	<p>For Gigabit Ethernet IQ and 10-Gigabit Ethernet SFPP interfaces only, define the rewrite profile to be applied to incoming frames on this logical interface.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Stacking a VLAN Tag output-vlan-map (Gigabit Ethernet IQ and 10-Gigabit Ethernet with SFPP) on page 612

instance

Syntax	<pre>instance <i>vpls-instance-name</i>;</pre>
Hierarchy Level	<pre>[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>name</i>]</pre>
Release Information	<p>Statement introduced in Junos OS Release 9.4.</p>
Description	<p>Specify the VPLS instance of the default maintenance domain.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Maintenance Intermediate Points maintenance-domain on page 561

interface

See the following sections:

- [interface \(Hierarchical CoS Schedulers\)](#) on page 494
- [interface \(IEEE 802.1x\)](#) on page 495
- [interface \(IEEE 802.1ag OAM Connectivity-Fault Management\)](#) on page 496
- [interface \(OAM Link-Fault Management\)](#) on page 497



NOTE: For information about the interface statement available at the [edit interfaces *interface-name* unit *logical-unit-number* family (inet | inet6) address *address* (vrrp-group | vrrp-inet6-group) *group-number* track] and [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family (inet | inet6) address *address* (vrrp-group | vrrp-inet6-group) *group-number* track] hierarchy levels, see the [Junos OS High Availability Configuration Guide](#).

interface (Hierarchical CoS Schedulers)

Syntax	interface <i>interface-name</i> ;
Hierarchy Level	[edit interfaces interface-set <i>interface-set-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify an interface that is a member of the interface set. Supported on Ethernet interfaces on an MX Series router, Ethernet interfaces on IQ2E PIC on M Series and T Series routers, and IP demux interfaces on an MX Series router.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Class of Service Configuration Guide

interface (IEEE 802.1x)

Syntax	<pre> interface <i>interface-id</i> { maximum-requests <i>integer</i>; quiet-period <i>seconds</i>; reauthentication (disable interval <i>seconds</i>); retries <i>integer</i>; server-timeout <i>seconds</i>; supplicant (<i>single</i>); supplicant-timeout <i>seconds</i>; transmit-period <i>seconds</i>; } </pre>
Hierarchy Level	[edit protocols dot1x authenticator]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Use this statement to configure the 802.1x Port-Based Network Access Control protocol-specific Ethernet interface options.
Default	The default values are provided for the options below on the respective statement pages.
Options	<p>maximum-requests—Specify the maximum number of retransmission times for an EAPOL Request packet to the client before it times out the authentication session.</p> <p>quiet-period—Specify the number of seconds the port remains in the wait state following a failed authentication exchange with the client, before reattempting the authentication.</p> <p>reauthentication—Includes two options:</p> <ul style="list-style-type: none"> • disable—Periodic reauthentication of the client is disabled. • interval—Specify the periodic reauthentication time interval. <p>retries—Specify the number of tries after which the port remains in the wait state for quiet-period seconds before reattempting the authentication.</p> <p>server-timeout—Specify the number of seconds the port waits for a reply when relaying a response from the client to the authentication server before timing out and invoking the server-fail action.</p> <p>supplicant (<i>single</i>)—Specify supplicant single mode. See the usage guidelines to configure other modes.</p> <p>supplicant-timeout—Specify the number of seconds the port waits for a response when relaying a request from the authentication server to the client before resending the request.</p> <p>transmit-period—Specify the number of seconds the port waits before retransmitting the initial EAPOL PDUs to the client.</p>

Required Privilege interface—To view this statement in the configuration.
Level interface-control—To add this statement to the configuration.

Related Documentation

- IEEE 802.1x Port-Based Network Access Control Overview
- authenticator on page 326
- dot1x on page 405

interface (IEEE 802.1ag OAM Connectivity-Fault Management)

Syntax interface (*interface-name* | ((*ge-* | *xe-*) (*fpc/pic/port* | *fpc/pic/port.unit-number* | *fpc/pic/port.unit-number* *vlan* *vlan-id*)));

Hierarchy Level [edit protocols oam ethernet connectivity-fault-management maintenance-domain *domain-name* maintenance-association *ma-name* mep *mep-id*]

Release Information Statement introduced in Junos OS Release 8.4.

Description For Ethernet interfaces on M320, MX Series, and T Series routers, configure IEEE 802.1ag Operation, Administration, and Management (OAM) support.

For Gigabit Ethernet interfaces and 10-Gigabit Ethernet interfaces on MX Series routers, configure IEEE 802.1ag Connectivity Fault Management (CFM) support on trunk interface ports.

Options **interface-name**—Interface to which the MEP is attached. It could be a physical Ethernet interface, logical Ethernet interface, or on a specific VLAN of a trunk port interface (MX Series only).

Required Privilege interface—To view this statement in the configuration.
Level interface-control—To add this statement to the configuration.

Related Documentation

- Configuring a Maintenance Endpoint
- Example: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers


interface (OAM Link-Fault Management)

Syntax	<pre> interface <i>interface-name</i> { apply-action-profile <i>profile-name</i>; link-discovery (active passive); pdu-interval <i>interval</i>; pdu-threshold <i>threshold-value</i>; remote-loopback; event-thresholds { frame-error <i>count</i>; frame-period <i>count</i>; frame-period-summary <i>count</i>; symbol-period <i>count</i>; } negotiation-options { allow-remote-loopback; no-allow-link-events; } } </pre>
Hierarchy Level	[edit protocols oam ethernet link-fault-management]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	For Ethernet interfaces on M320, MX Series, and T Series routers, configure IEEE 802.3ah Operation, Administration, and Management (OAM) support.
Options	<p>interface <i>interface-name</i>—Interface to be enabled for IEEE 802.3ah link fault management OAM support.</p> <p>Range: 1 through 10 interfaces can be tracked.</p> <p>The remaining statements are described separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Enabling IEEE 802.3ah OAM Support

interface-down

Syntax	interface-down;
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management action-profile <i>profile-name</i> default-actions]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Bring the interface down when a remote MEP connectivity failure is detected.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring a Connectivity Fault Management Action Profile

interface-mode

Syntax	interface-mode (access trunk);
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family bridge], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family bridge]
Release Information	Statement introduced in Junos OS Release 9.2.
Description	Determines whether the logical interface accepts or discards packets based on VLAN tags. Specify the trunk option to accept packets with a VLAN ID that matches the list of VLAN IDs specified in the vlan-id-list statement, then forward the packet within the bridge domain configured with the matching VLAN ID. Specify the access option to accept packets with no VLAN ID, then forward the packet within the bridge domain configured with the VLAN ID that matches the VLAN ID specified in the vlan-id statement.
	<div>  <p>NOTE: On MX Series routers, if you want IGMP snooping to be functional for a bridge domain, then you should not configure interface-mode and irb for that bridge. Such a configuration commit succeeds, but IGMP snooping is not functional, and a message informing the same is displayed. For more information, see Configuring a Trunk Interface on a Bridge Network.</p> </div>
Options	<p>access—Configure a logical interface to accept untagged packets. Specify the VLAN to which this interface belongs using the vlan-id statement. This option is not valid for Trio MPCs or MICs.</p> <p>trunk—Configure a single logical interface to accept packets tagged with any VLAN ID specified with the vlan-id-list statement.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring a Logical Interface for Access Mode Configuring a Logical Interface for Trunk Mode

interface-name

Syntax	interface-name;
Hierarchy Level	[edit interfaces <i>interface-name</i> auto-configure vlan-ranges authentication username-include], [edit interfaces <i>interface-name</i> auto-configure stacked-vlan-ranges authentication username-include],
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Append the interface name and VLAN ID or stacked VLAN ID to the username string used for authentication. The appended information takes the following format: <ul style="list-style-type: none">• For single VLAN—<interface-name>:<4-digit-vlan-id>• For stack VLANs—<interface-name>:<4-digit-svlan-id>-<4-digit-vlan-id>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring VLAN Interface Username Information for AAA Authentication

interface-range

Syntax	<pre> interface-range <i>name</i> { member-range <i>interface-name-fpc/pic/port</i> to <i>interface-name-fpc/pic/port</i>; member <i>interface-name-fpc/pic/port</i>; member <i>interface-name-fpc/[low-high]/*</i>; member <i>interface-name-fpc/[pic1,pic2,pic3...picN]/port</i> /*Common config is added as part of interface-range definition, as follows*/ mtu 256; hold-time up 10; ether-options { flow-control; speed { 100m; } 802.3ad primary; } } </pre>
Hierarchy Level	[edit interfaces]
Release Information	Statement introduced in Junos OS Release 10.0.
Description	<p>Specify a set of identical interfaces as an interface group, to which you can apply a common configuration to the entire set of interfaces. This group can consist of both lexical member ranges of interfaces specified using the member-range <i>interface-type-fpc/pic/port</i> to <i>xx-fpc/pic/port</i> option (regex not supported), and of individual or non-sequential members using the member <i>interface-type-fpc/pic/port</i> option (with regex support to specify the <i>fpc/pic/port</i> values).</p>
Options	<p>member-range—Adds interfaces in lexical order. Regex is not supported.</p> <p>Format:—member-range <start-range> to <end-range></p> <p>Example:—member-range ge-0/0/0 to ge-4/0/40;</p> <p>member—To add individual interfaces or multiple interfaces using regex.</p> <p>Format:—member <list of interface names></p> <p>Example:—member ge-0/0/0;</p> <p>member ge-0/1/1;</p> <p>member ge-0/*/*;</p> <p>member ge-0/[1-10]/0;</p> <p>member ge-1/[1,3,6,10]/12</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>

Related Documentation

- [Configuring Interface Ranges on page 92](#)

interface-set

See the following sections:

- [interface-set \(Ethernet Interfaces\)](#) on page 503
- [interface-set \(IP Demux Interfaces\)](#) on page 504

interface-set (Ethernet Interfaces)

Syntax	<pre>interface-set <i>interface-set-name</i> { interface <i>ethernet-interface-name</i> { (unit <i>unit-number</i> vlan-tags-outer <i>vlan-tag</i>); } }</pre>
Hierarchy Level	[edit interfaces]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	<p>The set of interfaces used to configure hierarchical CoS schedulers on Ethernet interfaces on the MX Series router and IQ2E PIC on M Series and T Series routers.</p> <p>The remaining statements are described separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring E-LINE and E-LAN Services for a PBB Network on MX Series Routers• Junos OS Class of Service Configuration Guide

interface-set (IP Demux Interfaces)

Syntax	<pre>interface-set <i>interface-set-name</i> { interface <i>interface-name</i> { unit <i>unit-number</i>; } }</pre>
Hierarchy Level	[edit interfaces]
Release Information	Statement introduced in Junos OS Release 9.2.
Description	<p>The set of interfaces used to configure hierarchical CoS schedulers for subscribers on IP demux interfaces on the MX Series router.</p> <p>The remaining statements are described separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>Junos Subscriber Access Configuration Guide</i>

interface-status-tlv

Syntax	<pre>interface-status-tlv [down lower-layer-down];</pre>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management action-profile <i>profile-name</i> event]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Defines an action-profile consisting of various events and the action. Based on values of interface-status-tlv in the received CCM packets, specific action such as <i>interface-down</i> can be taken using action-profile options.
Options	<p>down—When the incoming CCM packet contains interface status TLV with value down, the action will be triggered for this action-profile.</p> <p>lower-layer-down—When the incoming CCM packet contains interface status TLV with value lower-layer-down, the action will be triggered for this action-profile.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Remote MEP Action Profile Support

interface-switch

Syntax	<pre>interface-switch <i>connection-name</i> { interface <i>interface-name.unit-number</i>; interface <i>interface-name.unit-number</i>; }</pre>
Hierarchy Level	[edit protocols connections]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure Layer 2 switching cross-connects. The cross-connect is bidirectional, so packets received on the first interface are transmitted out the second interface, and those received on the second interface are transmitted out the first interface.</p> <p>For Layer 2 switching cross-connects to work, you must also configure MPLS.</p>
Options	interface <i>interface-name.unit-number</i> —Interface name. Include the logical portion of the name, which corresponds to the logical unit number.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Defining the Connection for Switching Cross-Connects on page 234Junos OS MPLS Applications Configuration Guide

interface-type

Syntax	<code>interface-type (bc coc1 ct1 ct3 dc ds so t1 t3);</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> no-partition],</code> <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i>],</code> <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i>],</code> <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> timeslot <i>timeslot-range</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For IQ and IQE interfaces only, configure the sublevel interface type.
Options	<p>bc—Dual—Port Channelized E1 and T1 ISDN PRI interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> timeslot <i>timeslot-range</i>]</code> hierarchy level to create a bearer (B) channel <code>bc-pim/0/port:channel</code> interface for each time you want to function as an ISDN PRI B-channel.</p> <p>coc1—Channelized OC1 interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type coc12-fpc/pic/port]</code> hierarchy level.</p> <p>ct1—Channelized T1 interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> interface-type ct3-fpc/pic/port<:channel>]</code> hierarchy level.</p> <p>ct3—Channelized T3 interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type coc1-fpc/pic/port:channel no-partition]</code> hierarchy level.</p> <p>dc—Dual-Port Channelized E1 and T1 ISDN PRI interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> timeslot <i>timeslot-range</i>]</code> hierarchy level to create a (D) channel <code>dc-pim/0/port</code> to control the B-channels.</p> <p>ds—DS0 interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> interface-type (ce1-fpc/pic/port ct1-fpc/pic/port<:channel>)]</code> hierarchy level.</p> <p>so—SONET/SDH interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type coc12-fpc/pic/port]</code> hierarchy level.</p> <p>t1—T1 interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type (coc12-fpc/pic/port coc1-fpc/pic/port)]</code> hierarchy level.</p> <p>t3—T3 interface type. You can specify this interface type at the <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type (coc12-fpc/pic/port coc1-fpc/pic/port:channel no-partition)]</code> hierarchy level.</p>

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Channelized E1 IQ and IQE Interfaces Overview • Channelized OC12/STM4 IQ and IQE Interfaces Overview • Configuring Channelized T3 IQ Interfaces

interfaces

Syntax	interfaces { ... }
Hierarchy Level	[edit]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure interfaces on the router.
Default	The management and internal Ethernet interfaces are automatically configured. You must configure all other interfaces.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Physical Interface Configuration Statements Overview on page 66 • Configuring Aggregated Ethernet Link Protection

interleave-fragments

Syntax	interleave-fragments;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For link services interfaces only, interleave long packets with high-priority packets. Allows small delay-sensitive packets, such as Voice over IP (VoIP) packets, to interleave with long fragmented packets. This minimizes the latency of delay-sensitive packets.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Junos OS Services Interfaces Configuration Guide

interval

Syntax	interval (10m 10s 1m 1s 100ms 10ms);
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>domain-name</i> maintenance-association <i>ma-name</i> continuity-check]
Release Information	Statement introduced in Junos OS Release 8.4. Ten milliseconds option introduced in Junos OS Release 9.1.
Description	The time between continuity check messages.
Options	10m —10 minutes. 10s —10 seconds. 1m —1 minute. 1s —1 second. 100ms —100 milliseconds. 10ms —10 milliseconds.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Continuity Check ProtocolExample: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers

inverse-arp

Syntax	inverse-arp;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet address <i>address</i> multipoint-destination <i>destination</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet address <i>address</i> multipoint-destination <i>destination</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	For ATM encapsulation, enable responses to receive inverse ATM ARP requests. For Frame Relay encapsulation, enable responses to receive inverse Frame Relay ARP requests.
Default	Inverse ARP is disabled on all ATM and Frame Relay interfaces.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Inverse ATM1 or ATM2 ARP Configuring Inverse Frame Relay ARP

invert-data

Syntax	invert-data;
Hierarchy Level	[edit interfaces <i>e1-fpc/pic/port</i>], [edit interfaces <i>t1-fpc/pic/port</i>], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> e1-options], [edit interfaces <i>interface-name</i> t1-options], [edit interfaces <i>interface-name</i> e3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Invert the transmission of unused data bits on the DS0, E1, E3, and T1 interface.



.....

NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the invert-data statement must be included at the [edit interfaces *e1-fpc/pic/port*] or [edit interfaces *t1-fpc/pic/port*] hierarchy level as appropriate.

.....

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring E1 Data Inversion• Configuring E3 Data Inversion• Configuring T1 Data Inversion

ipsec-sa

Syntax	<code>ipsec-sa sa-name;</code>
Hierarchy Level	[edit interfaces <i>es-fpc/pic/port</i> unit <i>logical-unit-number</i> family inet], [edit logical-systems <i>logical-system-name</i> interfaces <i>es-fpc/pic/port</i> unit <i>logical-unit-number</i> family inet]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the IP Security (IPsec) security association (SA) name associated with the interface.
Options	<i>sa-name</i> —IPsec security association name.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide• Junos OS System Basics Configuration Guide

isdn-options

Syntax	<pre>isdn-options { bchannel-allocation (ascending descending); calling-number <i>number</i>; incoming-called-number <i>number</i> <reject>; spid1 <i>spid-string</i>; spid2 <i>spid-string</i>; static-tei-val <i>value</i>; switch-type (att5e etsi nil ntdms100 ntt); t310 <i>seconds</i>; tei-option (first-call power-up); }</pre>
Hierarchy Level	<pre>[edit interfaces br-<i>pim</i>/O/<i>port</i>], [edit interfaces ct1-<i>pim</i>/O/<i>port</i>], [edit interfaces ce1-<i>pim</i>/O/<i>port</i>]</pre>
Release Information	Statement introduced before Junos OS Release 7.4. bchannel-allocation option added in Junos OS Release 8.3.
Description	<p>For J Series Services Routers only. Specify the ISDN options for configuring ISDN interfaces for group and user sessions.</p> <p>The statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ISDN Physical Interface PropertiesAllocating B-Channels for Dialout<i>Junos OS Interfaces and Routing Configuration Guide</i>

iteration-count

Syntax	<code>iteration-count <i>count-value</i>;</code>
Hierarchy Level	<code>[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>md-name</i> maintenance-association <i>ma-name</i> mep <i>mep-id</i> remote-mep <i>remote-mep-id</i> sla-iterator-profile <i>profile-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 11.1.
Description	Configure the number of iterations for which the connection partakes in the iterator for acquiring SLA measurements.
Options	<p><i>count-value</i>—Number of iterations for which the connection should partake in the iterator for acquiring SLA measurements.</p> <p>Range: 1 through 65,535</p> <p>Default: 0 (or infinite iterations)</p>
Required Privilege Level	<p>Configure—To enter configuration mode.</p> <p>Control—To modify any configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • sla-iterator-profile on page 706 • Configuring a Remote MEP with an Iterator Profile

iteration-period

Syntax	<code>iteration-period <i>iteration-period-value</i>;</code>
Hierarchy Level	<code>[edit protocols oam ethernet connectivity-fault-management performance-monitoring sla-iterator-profiles <i>profile-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 11.1.
Description	Configure the iteration period, which is the maximum number of cycles per iteration (that is, the number of connections registered to an iterator cannot exceed this value).
Options	<p><i>iteration-period-value</i>—Maximum number of cycles per iteration.</p> <p>Range: 1 through 2000</p> <p>Default: 2000</p>
Required Privilege Level	<p>Configure—To enter configuration mode.</p> <p>Control—To modify any configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring an Iterator Profile

keep-address-and-control

Syntax	keep-address-and-control;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family ccc], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family ccc]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For interfaces with encapsulation type PPP CCC, do not remove the address and control bytes before encapsulating the packet into a tunnel.
Default	If you do not include this statement, address and control bytes are removed before encapsulating the packet into a tunnel.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Disabling the Removal of Address and Control Bytes on page 196

keepalives

Syntax	<code>keepalives <interval seconds> <down-count number> <up-count number>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Enable the sending of keepalives on a physical interface configured with PPP, Frame Relay, or Cisco HDLC encapsulation.</p> <p>For ATM2 IQ interfaces only, you can enable keepalives on a logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:</p> <ul style="list-style-type: none"> • atm-ppp-llc—PPP over AAL5 LLC encapsulation. • atm-ppp-vc-mux—PPP over AAL5 multiplex encapsulation.
Default	Sending of keepalives is enabled by default. The default keepalive interval is 10 seconds for PPP, Frame Relay, or Cisco HDLC. The default down-count is 3 and the default up-count is 1 for PPP or Cisco HDLC.
Options	<p>down-count <i>number</i>—The number of keepalive packets a destination must fail to receive before the network takes down a link.</p> <p>Range: 1 through 255</p> <p>Default: 3</p> <p>interval <i>seconds</i>—The time in seconds between successive keepalive requests.</p> <p>Range: 1 through 32767 seconds</p> <p>Default: 10 seconds</p> <p>up-count <i>number</i>—The number of keepalive packets a destination must receive to change a link's status from down to up.</p> <p>Range: 1 through 255</p> <p>Default: 1</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Keepalives on page 136 • Configuring Frame Relay Keepalives

key

Syntax	<code>key number;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Adaptive Services PICs on M Series routers (except the M320 and M120 routers), identify an individual traffic flow within a tunnel, as defined in RFC 2890, <i>Key and Sequence Number Extensions to GRE</i> .
Options	<i>number</i> —Value of the key. Range: 0 through 4,294,967,295
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

l2tp-interface-id

Syntax	<code>l2tp-interface-id name;</code> (dedicated shared);
Hierarchy Level	[edit interfaces sp- <i>fpc/pic/port</i> unit <i>logical-unit-number</i> dial-options], [edit logical-systems <i>logical-system-name</i> interfaces sp- <i>fpc/pic/port</i> unit <i>logical-unit-number</i> dial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the L2TP options for configuring logical interfaces for group and user sessions.
Options	(dedicated shared)—Specifies whether a logical interface can host one (dedicated) or multiple (shared) sessions at one time. <i>name</i> —Interface identifier that must be replicated at the [edit access profile <i>name</i>] hierarchy level.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

lcp

See the following sections:

- **lcp (802.3ad) on page 517**
- **lcp (Aggregated Ethernet) on page 518**

lcp (802.3ad)

Syntax	<pre>lcp { traceoptions { file <i>lcpd</i>; flag <i>all</i>; } ppm (centralized distributed); }</pre>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> fastether-options 802.3ad], [edit interfaces <i>interface-name</i> ggether-options 802.3ad]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.3. The ppm (centralized distributed) option introduced in Junos OS Release 9.4.</p>
Description	<p>For aggregated Ethernet interfaces only, configure the Link Aggregation Control Protocol (LACP).</p> <p>On MX Series routers you can specify distributed or centralized periodic packet management (PPM).</p>
Default	<p>If you do not specify lcp as either active or passive, LACP remains passive.</p> <p>If you do not specify ppm as either centralized or distributed, PPM is distributed.</p>
Options	<ul style="list-style-type: none"> • active—Initiate transmission of LACP packets. • passive—Respond to LACP packets. • ppm—Set PPM to centralized or distributed. <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Aggregated Ethernet LACP

lACP (Aggregated Ethernet)

Syntax	<pre>lACP { (active passive); admin-key <i>key</i>; link-protection { disable; (revertive non-revertive); } periodic <i>interval</i>; system-id <i>mac-address</i>; system-priority <i>priority</i>; }</pre>
Hierarchy Level	[edit interfaces aex aggregated-ether-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	For aggregated Ethernet interfaces only, configure Link Aggregation Control Protocol (LACP).
Default	If you do not specify LACP as either active or passive, LACP remains passive.
Options	<ul style="list-style-type: none">• active—Initiate transmission of LACP packets.• passive—Respond to LACP packets. <p>The remaining statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Aggregated Ethernet LACP• Configuring Aggregated Ethernet LACP (CLI Procedure)• Example: Configuring Aggregated Ethernet High-Speed Uplinks with LACP Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch

layer2-policer

Syntax	<pre>layer2-policer { input-policer <i>policer-name</i>; input-three-color <i>policer-name</i>; output-policer <i>policer-name</i>; output-three-color <i>policer-name</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	<p>For 1-Gigabit Ethernet and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces on M Series and T Series routers, apply Layer 2 logical interface policers. The following policers are supported:</p> <ul style="list-style-type: none"> • Two-color • Single-rate tricolor marking (srTCM) • Two-rate tricolor marking (trTCM) <p>Two-color and tricolor policers are configured at the [edit firewall] hierarchy level.</p>
Options	<p>input-policer <i>policer-name</i>—Two-color input policer to associate with the interface. This statement is mutually exclusive with the input-three-color statement.</p> <p>input-three-color <i>policer-name</i>—Tricolor input policer to associate with the interface. This statement is mutually exclusive with the input-policer statement.</p> <p>output-policer <i>policer-name</i>—Two-color output policer to associate with the interface. This statement is mutually exclusive with the output-three-color statement.</p> <p>output-three-color <i>policer-name</i>—Tricolor output policer to associate with the interface. This statement is mutually exclusive with the output-policer statement.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Gigabit Ethernet Two-Color and Tricolor Policers • Junos OS Class of Service Configuration Guide • Junos OS Routing Policy Configuration Guide

lcp-max-conf-req

Syntax	<code>lcp-max-conf-req <i>number</i></code>
Hierarchy Level	[edit interfaces <i>so-fpc/pic/port</i> unit <i>number</i> ppp-options]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Set the maximum number of LCP Configure-Requests to be sent, after which the router goes to LCP down state.
Options	<i>number</i> —From 0 to 65,535, where 0 means send infinite LCP Configure-Requests, and any other value specifies the maximum number LCP Configure-Requests to send and then stop sending.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the LCP Configure-Request Maximum Sent on page 169ppp-options on page 646

lcp-restart-timer

Syntax	<code>lcp-restart-timer <i>milliseconds</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options]
Release Information	Statement introduced in Junos OS Release 8.1.
Description	For interfaces with PPP, PPP TCC, PPP over Ethernet, PPP over ATM, and PPP over Frame Relay encapsulations, configure a restart timer for the Link Control Protocol (LCP) component of a PPP session.
Options	<i>milliseconds</i> —The time, in milliseconds, between successive LCP configuration requests. Range: 20 through 10000 milliseconds Default: 3 seconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the PPP Restart Timers on page 170

level

Syntax	<code>level <i>number</i>;</code>
Hierarchy Level	<code>[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>domain-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 8.4.
Description	A number used in CFM messages to identify the maintenance association.
Options	number —A number used to identify the maintenance domain to which the CFM message belongs. Range: 0 through 7
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the Maintenance Domain LevelExample: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers

line-encoding

Syntax	line-encoding (ami b8zs);
Hierarchy Level	[edit interfaces <i>ct1-fpc/pic/port</i>], [edit interfaces <i>interface-name</i> t1-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Set the line encoding format on the T1 interface.



NOTE: When configuring CT1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the line-encoding statement must be included at the [edit interfaces *ct1-fpc/pic/port*] hierarchy level.

Default	The default line encoding is B8ZS.
Options	ami —Use Alternate Mark Inversion (AMI) line encoding. b8zs —Use bipolar with 8-zeros substitution (B8ZS) line encoding.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring T1 Line Encoding

line-protocol

Syntax	<code>line-protocol <i>protocol</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For serial interfaces only, configure the line protocol.
Options	<p><i>protocol</i>—You can specify the one of the following line protocols:</p> <ul style="list-style-type: none"> • eia530—Line protocol EIA-530 • v.35—Line protocol V.35 • x.21—Line protocol X.21
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring the Serial Line Protocol on page 275

line-rate

Syntax	<code>line-rate <i>line-rate</i>;</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> shdsl-options],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> shdsl-options]</p>
Release Information	Statement introduced in Junos OS Release 7.4.
Description	For J Series Services Routers only, configure the SHDSL line rate.
Options	<p><i>line-rate</i>—SHDSL line rate, in Kbps. Possible values are:</p> <p>2-wire (Kbps): 192, 256, 320, 384, 448, 512, 576, 640, 704, 768, 832, 896, 960, 1024, 1088, 1152, 1216, 1280, 1344, 1408, 1472, 1536, 1600, 1664, 1728, 1792, 1856, 1920, 1984, 2048, 2112, 2176, 2240, 2304, auto</p> <p>4-wire (Kbps): 384, 512, 640, 768, 896, 1024, 1152, 1280, 1408, 1536, 1664, 1792, 1920, 2048, 2176, 2304, 2432, 2560, 2688, 2816, 2944, 3072, 3200, 3328, 3456, 3584, 3712, 3840, 3968, 4096, 4224, 4352, 4480, 4608</p> <p>Default: For 2-wire mode, auto; for 4-wire mode, 4608 Kbps</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • ATM-over-SHDSL Overview

linear-red-profile

Syntax	<code>linear-red-profile <i>profile-name</i>;</code>
Hierarchy Level	<code>[edit interfaces at-<i>fpc/pic/port</i> atm-options scheduler-maps <i>map-name</i> class-name]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, assign a linear RED profile to a specified forwarding class. To define the linear RED profiles, include the linear-red-profiles statement at the [edit interfaces at-<i>fpc/pic/port</i> atm-options] hierarchy level.
Default	If you do not include either the epd-threshold or the linear-red-profile statement in the forwarding class configuration, the Junos OS uses an EPD threshold based on the available bandwidth and other parameters.
Options	<i>profile-name</i> —Name of the linear RED profile.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring an ATM Scheduler Maplinear-red-profiles on page 525

linear-red-profiles

Syntax	linear-red-profiles <i>profile-name</i> { high-plp-threshold <i>percent</i> ; low-plp-threshold <i>percent</i> ; queue-depth <i>cells</i> ; }
Hierarchy Level	[edit interfaces <i>at-fpc/pic/port</i> atm-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define CoS virtual circuit drop profiles for RED. When a packet arrives, RED checks the queue fill level. If the fill level corresponds to a nonzero drop probability, the RED algorithm determines whether to drop the arriving packet.
Options	<i>profile-name</i> —Name of the drop profile. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring ATM2 IQ VC Tunnel CoS Components

link-adjacency-loss

Syntax	link-adjacency-loss;
Hierarchy Level	[edit protocols oam ethernet link-fault-management action-profile event]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Loss of adjacency with IEEE 802.3ah link-fault management peer event. When included, the loss-of-adjacency event triggers the action specified under the action statement.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Monitoring the Loss of Link Adjacency

link-discovery

Syntax	link-discovery (active passive);
Hierarchy Level	[edit protocols oam ethernet link-fault-management interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	For Ethernet interfaces on M320, M120, MX Series, and T Series routers, specify the discovery mode used for IEEE 802.3ah Operation, Administration, and Management (OAM) support. The discovery process is triggered automatically when OAM 802.3ah functionality is enabled on a port. Link monitoring is done when the interface sends periodic OAM PDUs.
Options	(active passive)—Passive or active mode. In active mode, the interface discovers and monitors the peer on the link if the peer also supports IEEE 802.3ah OAM functionality. In passive mode, the peer initiates the discovery process. Once the discovery process is initiated, both sides participate in discovery.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Link Discovery

link-down

Syntax	link-down;
Hierarchy Level	[edit protocols oam ethernet link-fault-management]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Mark the interface down for transit traffic.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Specifying the Actions to Be Taken for Link-Fault Management Events

link-event-rate

Syntax	<pre>link-event-rate { frame-error <i>count</i>; frame-period <i>count</i>; frame-period-summary <i>count</i>; symbol-period <i>count</i>; }</pre>
Hierarchy Level	[edit protocols oam ethernet link-fault-management action-profile event]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Configure the number of link-fault management events per second.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Threshold Values for Fault Events in an Action Profile

link-fault-management

```
Syntax  link-fault-management {  
        action-profile profile-name {  
            action {  
                link-down;  
                send-critical-event;  
                syslog;  
            }  
            event {  
                link-adjacency-loss;  
                link-event-rate {  
                    frame-error count;  
                    frame-period count;  
                    frame-period-summary count;  
                    symbol-period count;  
                }  
            }  
            protocol-down;  
        }  
    }  
    interface interface-name {  
        apply-action-profile profile-name;  
        link-discovery (active | passive);  
        pdu-interval interval;  
        pdu-threshold threshold-value;  
        remote-loopback;  
        event-thresholds {  
            frame-error count;  
            frame-period count;  
            frame-period-summary count;  
            symbol-period count;  
        }  
        negotiation-options {  
            allow-remote-loopback;  
            no-allow-link-events;  
        }  
    }  
}
```

Hierarchy Level [edit protocols oam ethernet]

Release Information Statement introduced in Junos OS Release 8.2.

Description For Ethernet interfaces on M320, M120, MX Series, and T Series routers, specify fault signaling and detection for IEEE 802.3ah Operation, Administration, and Management (OAM) support.

The remaining statements are explained separately.



Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation • [Enabling IEEE 802.3ah OAM Support](#)

link-layer-overhead

Syntax	<code>link-layer-overhead <i>percent</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For AS PIC or MultiServices PIC link services IQ interfaces (lsq) only, configure the percentage of total bundle bandwidth to be set aside for link-layer overhead.
Options	percent —Percentage of total bundle bandwidth to be set aside for link-layer overhead. Range: 0 through 50 percent Default: 4 percent
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	• Junos OS Services Interfaces Configuration Guide

link-mode

Syntax	link-mode <i>mode</i> (automatic full-duplex half-duplex);
Hierarchy Level	[edit interfaces <i>interface-name</i>], [edit interfaces <i>interface-name</i> ether-options], [edit interfaces <i>ge-pim</i> /0/0 switch-options switch-port <i>port-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Set the device's link connection characteristic.
Options	<p><i>mode</i>—Link characteristics:</p> <ul style="list-style-type: none">• automatic—Link mode is negotiated. This is the default for EX Series switches.• full-duplex—Connection is full duplex.• half-duplex—Connection is half duplex. <p>Default: Fast Ethernet interfaces, except the J Series ePIM Fast Ethernet interfaces, can operate in either full-duplex or half-duplex mode. The router's management Ethernet interface, fxp0 or em0, the built-in Fast Ethernet interfaces on the FIC (M7i router), and the Gigabit Ethernet ports on J Series Services Routers with uPIMs installed and configured for access switching mode autonegotiate whether to operate in full-duplex or half-duplex mode. Unless otherwise noted here, all other interfaces operate only in full-duplex mode.</p>
	<div><p>NOTE: On J Series ePIM Fast Ethernet interfaces, if you specify half-duplex (or if full-duplex mode is not autonegotiated), the following message is written to the system log: "Half-duplex mode not supported on this PIC, forcing full-duplex mode."</p></div>
	<div><p>NOTE: On EX Series switches, if no-auto-negotiation is specified in [edit interfaces <i>interface-name</i> ether-options], you can select only full-duplex or half-duplex. If auto-negotiation is specified, you can select any mode.</p></div>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Link Characteristics on Ethernet Interfaces

link-protection

Syntax	<pre>link-protection { disable; (revertive non-revertive); }</pre>
Hierarchy Level	<pre>[edit interfaces aex aggregated-ether-options] [edit interfaces aex aggregated-ether-options lcp]</pre>
Release Information	<p>Statement introduced in Junos OS Release 8.3.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Support for disable, revertive, and non-revertive statements added in Junos OS Release 9.3.</p>
Description	<p>On the router, for aggregated Ethernet interfaces only, configure link protection. In addition to enabling link protection, a primary and a secondary (backup) link must be configured to specify what links egress traffic should traverse. To configure primary and secondary links on the router, include the primary and backup statements at the [edit interfaces ge-fpc/pic/port gigether-options 802.3ad aex] hierarchy level or the [edit interfaces fe-fpc/pic/port fastether-options 802.3ad aex] hierarchy level.</p> <p>To configure those links on the switch, configure those statements at the [edit interfaces ge-fpc/pic/port ether-options 802.3ad aex] hierarchy level or at the [edit interfaces xe-fpc/pic/port ether-options 802.3ad aex] hierarchy level.</p>
Options	The statements are explained separately.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Aggregated Ethernet Link Protection

link-speed

See the following sections:

- **link-speed (Aggregated Ethernet)** on page 532
- **link-speed (Aggregated SONET/SDH)** on page 533

link-speed (Aggregated Ethernet)

Syntax	<code>link-speed <i>speed</i>;</code>
Hierarchy Level	[edit interfaces aex aggregated-ether-options], [edit interfaces interface-range <i>name</i> aggregated-ether-options], [edit interfaces interface-range <i>name</i> aggregated-sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	For aggregated Ethernet interfaces only, set the required link speed.
Options	<i>speed</i> —For aggregated Ethernet links, you can specify <i>speed</i> in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000). Aggregated Ethernet links on the M120 router can have one of the following speed values: <ul style="list-style-type: none">• 100m—Links are 100 Mbps.• 10g—Links are 10 Gbps.• 1g—Links are 1 Gbps.• oc192—Links are OC192 or STM64c. Aggregated Ethernet links on EX Series switches can be configured to operate at one of the following speed values: <ul style="list-style-type: none">• 10m• 100m• 1g• 10g
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Aggregated Ethernet Link Speed• Configuring Aggregated Ethernet Interfaces (CLI Procedure)• Example: Configuring Aggregated Ethernet High-Speed Uplinks Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch

link-speed (Aggregated SONET/SDH)

Syntax	link-speed (<i>speed</i> mixed);
Hierarchy Level	[edit interfaces asx aggregated-sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4. mixed option added in Release 8.0.
Description	For aggregated SONET/SDH interfaces only, set the required link speed.
Options	<p>speed—Aggregated SONET/SDH links can have one of the following speed values.</p> <ul style="list-style-type: none">• oc3—Links are OC3c or STM1c.• oc12—Links are OC12c or STM4c.• oc48—Links are OC48c or STM16c.• oc192—Links are OC192c or STM64c.• oc768—Links are OC768c or STM256c. <p>mixed—For aggregated SONET/SDH links on T Series routers, you can mix interface speeds in SONET/SDH aggregation bundles. Interface speeds from OC3 through OC768 are supported.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Aggregated Ethernet Link Speed• Configuring Aggregated SONET/SDH Link Speed

linktrace

Syntax	<pre>linktrace { age (30m 10m 1m 30s 10s); path-database-size <i>path-database-size</i>; }</pre>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Configure connectivity fault management linktrace parameters.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Linktrace Protocol in CFM

lmi

See the following sections:

- **lmi (Frame Relay) on page 536**
- **lmi (Ethernet OAM) on page 538**

lmi (Frame Relay)

Syntax `lmi {
 lmi-type (ansi | itu);
 n391dte number;
 n392dce seconds;
 n392dte number;
 n393dce number;
 n393dte number;
 t391dte number;
 t392dce seconds;
}`

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Set Frame Relay keepalive parameters.

Options **n391dte**—DTE full status polling interval.
Range: 1 through 255
Default: 6

n392dce—DCE error threshold, in number of errors.
Range: 1 through 10
Default: 3

n392dte—DTE error threshold, in number of errors.
Range: 1 through 10
Default: 3

n393dce—DCE monitored event-count.
Range: 1 through 10
Default: 4

n393dte—DTE monitored event-count.
Range: 1 through 10
Default: 4

t391dte—DTE polling timer.
Range: 5 through 30 seconds
Default: 10 seconds

t392dce—DCE polling timer.
Range: 5 through 30 seconds
Default: 15 seconds

The remaining statements are explained separately.

Required Privilege	interface—To view this statement in the configuration.
Level	interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Tunable Keepalives for Frame Relay LMI• lmi-type on page 539

lmi (Ethernet OAM)

Syntax

```
lmi {  
  status-counter count;  
  polling-verification-timer value;  
  interface name {  
    uni-id uni-name;  
    status-counter number;  
    polling-verification-timer value;  
    evc-map-type (all-to-one-bundling | bundling | service-multiplexing);  
    evc evc-name {  
      default-evc;  
      vlan-list vlan-id-list;  
    }  
  }  
}
```

Hierarchy Level [edit protocols oam ethernet]

Release Information Statement introduced in Junos OS Release 9.5.

Description On routers with **ge**, **xe**, or **ae** interfaces, configure an OAM Ethernet local management interface.

Options

- status-counter *count***—Status counter (N393), defaults to 4.
- interface *name***—Polling verification timer (T392), defaults to 15 seconds.
- uni-id *uni-name***—(Optional) Defaults to the physical interface name.
- status-counter *number***—(Optional) Defaults to a global value.
- polling-verification-timer *value***—(Optional) Defaults to a global value.
- evc-map-type (all-to-one-bundling | bundling | service-multiplexing)**—Specify the Ethernet virtual connection (EVC) map type.
- evc *evc-name***—Specify the name of the EVC.
- default-evc**—Set the specified EVC as the default EVC.
- vlan-list *vlan-id-list***—Specify a group of VLANs to assign to the EVC.

Required Privilege Level

- interface—To view this statement in the configuration.
- interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Ethernet Local Management Interface
- evcs on page 437

lmi-type

Syntax	<code>lmi-type (ansi itu c-lmi);</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> lmi],</code> <code>[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Set Frame Relay Local Management Interface (LMI) type.



NOTE: Consortium LMI is supported only on M320 routers with Enhanced III FPCs and specific IQE PICs.

Options	<p>ansi—Use ANSI T1.167 Annex D LMIs.</p> <p>itu—Use ITU Q933 Annex A LMIs.</p> <p>c-lmi—Use Consortium LMI.</p> <p>Default: ansi</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Tunable Keepalives for Frame Relay LMI Junos OS Services Interfaces Configuration Guide

load-interval

Syntax	<code>load-interval <i>seconds</i>;</code>
Hierarchy Level	[edit interfaces <i>dlr</i> unit <i>logical-unit-number</i> dialer-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>dlr</i> unit <i>logical-unit-number</i> dialer-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	On J Series Services Routers with ISDN logical interfaces, specify the interval used to calculate the average load on the network. By default, the average interface load is calculated every 60 seconds.
Options	<i>seconds</i> —Number of seconds at which the average load calculation is triggered. Range: 20 through 180, in 10-second intervals Default: 60 seconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ISDN Logical Interface Properties<i>Junos OS Interfaces and Routing Configuration Guide</i>

load-threshold

Syntax	<code>load-threshold <i>percent</i>;</code>
Hierarchy Level	[edit interfaces <i>dlr</i> unit <i>logical-unit-number</i> dialer-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>dlr</i> unit <i>logical-unit-number</i> dialer-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	On J Series Services Routers with ISDN logical interfaces, specify the bandwidth threshold percentage used for adding interfaces. Another link is added to the multilink bundle when the load reaches the threshold value you set. Specify a percentage between 0 and 100.
Options	<i>percent</i> —Bandwidth threshold percentage used for adding interfaces. When set to 0, all available channels are dialed. Range: 0 through 100 seconds Default: 100 seconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Bandwidth on Demand<i>Junos OS Interfaces and Routing Configuration Guide</i>

local-name

Syntax	<code>local-name name;</code>
Hierarchy Level	<code>[edit interfaces interface-name ppp-options chap],</code> <code>[edit interfaces interface-name ppp-options pap],</code> <code>[edit interfaces interface-name unit logical-unit-number ppp-options chap],</code> <code>[edit interfaces interface-name unit logical-unit-number ppp-options pap],</code> <code>[edit logical-systems logical-system-name interfaces interface-name unit logical-unit-number ppp-options chap],</code> <code>[edit logical-systems logical-system-name interfaces interface-name unit logical-unit-number ppp-options pap]</code>
Release Information	Statement introduced before Junos OS Release 7.4. Support for PAP added in Junos OS Release 8.3.
Description	<p>For CHAP authentication, the value sent in CHAP challenge and response packets on a per interface basis. For PAP authentication, the local hostname for sending PAP authentication requests.</p> <p>For ATM2IQ interfaces only, you can configure a CHAP local name on the logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:</p> <ul style="list-style-type: none">• atm-ppp-llc—PPP over AAL5 LLC encapsulation.• atm-ppp-vc-mux—PPP over AAL5 multiplex encapsulation.
Default	For CHAP authentication, if you do not include the local-name statement in the configuration, the interface sends the router's system hostname in CHAP challenge and response packets.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the PPP Challenge Handshake Authentication Protocol on page 121• Configuring the PPP Password Authentication Protocol on page 124• Junos OS System Basics Configuration Guide

local-password

Syntax	<code>local-password password;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> ppp-options pap], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options pap], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options pap]
Release Information	Statement introduced in Junos OS Release 8.3.
Description	Configure the host password for sending PAP requests.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring the Local Password on page 173 Configuring the PPP Password Authentication Protocol on page 124

lockout

Syntax	<code>lockout;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure a lockout of protection, forcing the use of the working circuit and locking out the protect circuit regardless of anything else.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Switching Between the Working and Protect Circuits

log-prefix

Syntax	<code>log-prefix <i>prefix-number</i>;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> services-options host <i>hostname</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Set the system logging prefix value.
Options	<i>prefix-number</i> —System logging prefix value.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

logical-interface-fpc-redundancy (Aggregated Ethernet Subscriber Interfaces)

Syntax	<code>logical-interface-fpc-redundancy;</code>
Hierarchy Level	<code>[edit interfaces <i>aenumber</i> aggregated-ether-options]</code>
Release Information	Statement introduced in Junos OS Release 11.2.
Description	<p>Provide module redundancy for demux subscribers on aggregated Ethernet bundles configured with targeted distribution. Backup links for a subscriber are chosen on a different EQ DPC or Trio MPC from the primary link, based on the link with the fewest number of subscribers among the links on different modules. If all links are on a single module when this is configured, backup links are not provisioned.</p> <p>By default, link redundancy is provided for the aggregated Ethernet bundle.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Link and Module Redundancy for Demux Subscribers in an Aggregated Ethernet Interface

logical-interface-policer

Syntax	logical-interface-policer;
Hierarchy Level	[edit firewall policer <i>policer-template-name</i>], [edit firewall three-color-policer <i>policer-name</i>],
Release Information	Statement introduced in Junos OS Release 8.2.
Description	Apply a policer to a logical interface in the ingress or egress direction as part of a configuration to discard high loss priority traffic, or configure an aggregate policer.
Required Privilege Level	firewall—To view this statement in the configuration. firewall-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Gigabit Ethernet Two-Color and Tricolor Policers• Junos OS Class of Service Configuration Guide• action (Policer) on page 300


logical-systems

Syntax	logical-systems <i>logical-system-name</i> ;
Hierarchy Level	[edit]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure a logical system.
Options	<i>logical-system-name</i> —Name of the logical system.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Logical System Interface Properties on page 163

long-buildout

Syntax	(long-buildout no-long-buildout);
Hierarchy Level	[edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure the T3 line buildout. A T3 interface has two settings for the T3 line buildout: a short setting, which is less than 255 feet (68 meters), and a long setting, which is greater than 255 feet and shorter than 450 feet (137 meters).</p> <p>This statement applies to copper-cable-based T3 interfaces only. You cannot configure a line buildout for a DS3 channel on a channelized OC12 interface, which runs over fiber-optic cable.</p>
Default	A T3 interface uses the short line buildout setting (no-long-buildout) for wires shorter than 255 feet (68 meters).
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the T3 Line Buildout

loop-timing

Syntax	(loop-timing no-loop-timing);
Hierarchy Level	[edit interfaces ct3- <i>fpc/pic/port</i> t3-options], [edit interfaces e1- <i>fpc/pic/port:0</i> sonet-options], [edit interfaces stm1- <i>fpc/pic/port</i> sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For channelized IQ interfaces and non-IQ channelized STM1 interfaces only, configure the SONET/SDH or DS3-level clocking source.
	<div>  <p>NOTE: On M Series, MX Series, and T Series routers, under E1 channels, loop timing can be configured only at channel 0. When you configure on channel 0, it is applicable on all channels as internal by default.</p> </div>
Options	<p>loop-timing—Configure loop timing (external) clocking.</p> <p>no-loop-timing—Configure line timing (internal) clocking.</p> <p>Default: no-loop-timing</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Channelized IQ and IQE SONET/SDH Loop Timing Configuring the Channelized T3 Loop Timing clocking on page 360

loopback

See the following sections:

- **loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) on page 549**
- **loopback (Aggregated Ethernet, Fast Ethernet, and Gigabit Ethernet) on page 550**
- **loopback (Serial) on page 551**

loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3)

Syntax	<code>loopback (local payload remote);</code>
Hierarchy Level	<code>[edit interfaces ce1-fpc/pic/port],</code> <code>[edit interfaces ct1-fpc/pic/port],</code> <code>[edit interfaces t1-fpc/pic/port],</code> <code>[edit interfaces interface-name ds0-options],</code> <code>[edit interfaces interface-name dsl-options],</code> <code>[edit interfaces interface-name e1-options],</code> <code>[edit interfaces interface-name e3-options],</code> <code>[edit interfaces interface-name shdsl-options],</code> <code>[edit interfaces interface-name sonet-options],</code> <code>[edit interfaces interface-name t1-options],</code> <code>[edit interfaces interface-name t3-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure a loopback connection. To turn off the loopback capability, remove the loopback statement from the configuration.



NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **loopback** statement must be included with the **local** or **remote** option at the `[edit interfaces ce1-fpc/pic/port]` or `[edit interfaces ct1-fpc/pic/port]` hierarchy level as appropriate.

When configuring T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **loopback** statement must be included with the **payload** option at the `[edit interfaces t1-fpc/pic/port]` hierarchy level.

To configure loopback on channelized IQ and IQE PICs, SONET/SDH level, use the **sonet-options loopback** statement **local** and **remote** options at the controller interface (coc48, cstm16, coc12, cstm4, coc3, cstm1). It is ignored for path-level interfaces **so-fpc/pic/port** or **so-fpc/pic/port:channel**.

Options	<p>local—Loop packets, including both data and timing information, back on the local router's PIC. NxDS0 IQ interfaces do not support local loopback.</p> <p>payload—For channelized T3, T1, and NxDS0 IQ interfaces only, loop back data only (without clocking information) on the remote router's PIC. With payload loopback, overhead is recalculated. Neither ATM-over-asymmetrical digital subscriber line (ADSL) interfaces nor ATM-over-SHDSL interfaces support payload loopback.</p> <p>remote—Loop packets, including both data and timing information, back on the remote router's interface card. NxDS0 IQ interfaces do not support remote loopback.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>

- Related Documentation**
- Configuring E3 and T3 Parameters on ATM Interfaces
 - Configuring E1 Loopback Capability
 - Configuring E3 Loopback Capability
 - Configuring Channelized IQ and IQE SONET/SDH Loop Timing
 - Configuring SHDSL Operating Mode on an ATM Physical Interface
 - Configuring T1 Loopback Capability
 - Configuring T3 Loopback Capability
 - **feac-loop-respond** on page 447

loopback (Aggregated Ethernet, Fast Ethernet, and Gigabit Ethernet)

Syntax (loopback | no-loopback);

Hierarchy Level [edit interfaces *interface-name* aggregated-ether-options],
[edit interfaces *interface-name* ether-options],
[edit interfaces *interface-name* fastether-options],
[edit interfaces *interface-name* ggether-options],
[edit interfaces interface-range *name* ether-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description For aggregated Ethernet, Fast Ethernet, Gigabit Ethernet, and 10-Gigabit Ethernet interfaces, enable or disable loopback mode.



.....

NOTE: By default, local aggregated Ethernet, Fast Ethernet, Tri-Rate Ethernet copper, Gigabit Ethernet, and 10-Gigabit Ethernet interfaces connect to a remote system.

.....

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

- Related Documentation**
- Configuring Ethernet Loopback Capability

loopback (Serial)

Syntax	<code>loopback <i>mode</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure a loopback connection.
Default	If you do not include this statement, there is no loopback connection.
Options	<i>mode</i> —You can specify the one of the following loopback modes: <ul style="list-style-type: none">• dce-local—For EIA-530 interfaces only, loop packets back on the local DCE.• dce-remote—For EIA-530 interfaces only, loop packets back on the remote DCE.• local—Loop packets back on the local router's PIC.• remote—Loop packets back on the line interface unit (LIU).
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Serial Loopback Capability on page 285

loopback-clear-timer

Syntax	<code>loopback-clear-timer seconds;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	For interfaces with PPP, PPP TCC, PPP over Ethernet, PPP over ATM, and PPP over Frame Relay encapsulations, configure a loop detection clear timer for the Link Control Protocol (LCP) component of a PPP session.
Options	seconds —The time in seconds to wait before the loop detection flag is cleared if it is not cleared by the protocol. Range: 1 through 60 seconds Default: 9 seconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the PPP Clear Loop Detected Timer on page 170

loss-priority

Syntax	<code>loss-priority (high low);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> <i>gigether-options</i> ethernet-switch-profile <i>ethernet-policer-profile</i> output-priority-map classifier premium forwarding-class <i>class-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the packet loss priority value.
Options	high —Packet has high loss priority. low —Packet has low loss priority.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Specifying an Output Priority Map

loss-threshold

Syntax	<code>loss-threshold <i>number</i>;</code>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>domain-name</i> maintenance-association <i>ma-name</i> continuity-check]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	The number of continuity check messages lost before marking the remote MEP as down.
Options	number —Specify how many continuity check messages can be lost before the remote MEP is considered down.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Continuity Check Protocol

low-plp-max-threshold

Syntax	<code>low-plp-max-threshold <i>percent</i>;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options linear-red-profiles <i>profile-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define the drop profile fill-level for the low PLP CoS VC. When the fill level exceeds the defined percentage, all packets are dropped.
Options	percent —Fill-level percentage when linear RED is applied to cells with PLP.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring ATM2 IQ VC Tunnel CoS Components high-plp-max-threshold on page 466 low-plp-threshold on page 554 queue-depth on page 663

low-plp-threshold

Syntax	<code>low-plp-threshold <i>percent</i>;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options linear-red-profiles <i>profile-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define the CoS VC drop profile fill-level percentage when linear RED is applied to cells with low PLP. When the fill level exceeds the defined percentage, packets with low PLP are randomly dropped by RED. This statement is mandatory.
Options	<i>percent</i> —Fill-level percentage when linear RED is applied to cells with low PLP.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring ATM2 IQ VC Tunnel CoS Components• high-plp-max-threshold on page 466• high-plp-threshold on page 467• low-plp-max-threshold on page 553• queue-depth on page 663

lowest-priority-defect

Syntax	lowest-priority-defect (all-defects err-xcon mac-rem-err-xcon no-defect rem-err-xcon xcon)
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>domain-name</i> maintenance-association <i>ma-name</i> mep <i>mep-id</i>]
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Specify the lowest priority defect that is allowed to generate a Fault Alarm whenever CFM detects a defect. This configuration is done at the MEP level.
Options	Specify one of the following lowest priority defect options: <p>all-defects—Allows all defects.</p> <p>err-xcon—Allows only erroneous CCM and cross-connect CCM defects.</p> <p>mac-rem-err-xcon—Allows only MAC, not receiving CCM, erroneous CCM, and cross-connect defects.</p> <p>no-defect—Allows no defects.</p> <p>rem-err-xcon—Allows only not receiving CCM, erroneous CCM, and cross-connect CCM defects.</p> <p>xcon—Allows only cross-connect CCM defects.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring the Maintenance End Point Lowest Priority Defect

lsq-failure-options

Syntax	<pre>lsq-failure-options { no-termination-request; [trigger-link-failure <i>interface-name</i>]; }</pre>
Hierarchy Level	[edit interfaces <i>lsq-fpc/pic/port</i>]
Release Information	Statement introduced in Junos OS Release 7.4.
Description	For AS PIC or MultiServices PIC link services IQ (lsq) interfaces only, define the failure recovery option settings.
Options	The remaining statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

mac

Syntax	<pre>mac <i>mac-address</i>;</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Set the MAC address of the interface. You can configure the MAC address on the management Ethernet interface (fxp0 or em0) only.
Options	mac-address —MAC address. Specify the MAC address as six hexadecimal bytes in one of the following formats: <i>nnnn.nnnn.nnnn</i> or <i>nn:nn:nn:nn:nn:nn</i> . For example, 0011.2233.4455 or 00:11:22:33:44:55.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the MAC Address on the Management Ethernet Interface

mac-address

See the following sections:

- **mac-address (Accept Source Mac)** on page 557
- **mac-address (VLAN and Stacked VLAN Interfaces)** on page 557


mac-address (Accept Source Mac)

Syntax	<code>mac-address <i>mac-address</i> policer;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> accept-source-mac], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> accept-source-mac]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Gigabit Ethernet IQ and Gigabit Ethernet PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), and for Gigabit Ethernet DPCs on MX Series routers, specify a remote MAC address on which to count incoming and outgoing packets.
Options	mac-address —MAC address. Specify the MAC address as six hexadecimal bytes in one of the following formats: <i>nnnn.nnnn.nnnn</i> or <i>nn:nn:nn:nn:nn:nn</i> . For example, 0011.2233.4455 or 00:11:22:33:44:55. policer —MAC policer. For more information, see policer (MAC) .
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring MAC Address Filtering

mac-address (VLAN and Stacked VLAN Interfaces)

Syntax	<code>mac-address;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> auto-configure <i>vlan-ranges</i> authentication username-include], [edit interfaces <i>interface-name</i> auto-configure <i>stacked-vlan-ranges</i> authentication username-include],
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Specify that the client hardware address (chaddr) from the incoming DHCP discover packet be concatenated with the username during the subscriber authentication process.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring VLAN Interface Username Information for AAA Authentication

mac-learn-enable

Syntax	(mac-learn-enable no-mac-learn-enable);
Hierarchy Level	[edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For Gigabit Ethernet IQ and Gigabit Ethernet PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), and for Gigabit Ethernet DPCs on MX Series routers, configure whether source and destination MAC addresses are dynamically learned:</p> <ul style="list-style-type: none">• mac-learn-enable—Allow the interface to dynamically learn source and destination MAC addresses.• no-mac-learn-enable—Prohibit the interface from dynamically learning source and destination MAC addresses. <p>MAC address learning is based on source addresses. You can start accounting for traffic after there has been traffic sent from the MAC address. Once the MAC address is learned, the frames and bytes transmitted to or received from the MAC address can be tracked.</p>
	<div> NOTE: When you gather interfaces into a bridge domain, the no-mac-learn-enable statement at the [edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile] hierarchy level is not supported. You must use the no-mac-learning statement at the [edit bridge-domains <i>bridge-domain-name</i> bridge-options interface <i>interface-name</i>] hierarchy level to disable MAC learning on an interface in a bridge domain. For information on disabling MAC learning for a bridge domain, see <i>MX Series Layer 2 Configuration Guide</i>.</div>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring MAC Address Filtering

mac-validate

Syntax	mac-validate (loose strict);
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Enable IP and MAC address validation for static Ethernet and IP demux interfaces. Supported on MX Series routers only.
Options	<p>loose—Forwards incoming packets when both the IP source address and the MAC source address match one of the trusted address tuples. Drops packets when the IP source address matches one of the trusted tuples, but the MAC address does not match the MAC address of the tuple. Continues to forward incoming packets when the source address of the incoming packet does not match any of the trusted IP addresses.</p> <p>strict—Forwards incoming packets when both the IP source address and the MAC source address match one of the trusted address tuples. Drops packets when the MAC address does not match the tuple's MAC source address, or when IP source address of the incoming packet does not match any of the trusted IP addresses.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• MAC Address Validation on Static Ethernet Interfaces Overview• Configuring MAC Address Validation on Static Demux Interfaces on page 263

maintenance-association

Syntax `maintenance-association ma-name {
 short-name-format (character-string | vlan | 2octet | rfc-2685-vpn-id);
 continuity-check {
 hold-interval minutes;
 interval (10m | 10s | 1m | 1s | 100ms);
 loss-threshold number;
 }
 mep mep-id {
 auto-discovery;
 direction (up | down);
 interface interface-name (protect | working);
 lowest-priority-defect (all-defects | err-xcon | mac-rem-err-xcon | no-defect |
 rem-err-xcon | xcon);
 priority number;
 remote-mep mep-id {
 action-profile profile-name;
 sla-iterator-profile profile-name {
 data-tlv-size size;
 iteration-count count-value;
 priority priority-value;
 }
 }
 }
 }
 }`

Hierarchy Level `[edit protocols oam ethernet connectivity-fault-management maintenance-domain
 domain-name]`

Release Information Statement introduced in Junos OS Release 8.4.

Description Configure the name of the maintenance association in IEEE-compliant format.

Options **ma-name**—The name of the maintenance association within the maintenance domain.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

Related Documentation

- Creating a Maintenance Association
- Configuring a Maintenance Endpoint
- Example: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers

maintenance-domain

```
Syntax maintenance-domain domain-name {
    bridge-domain name <vlan-id [ vlan-ids ]>;
    instance vpls-instance-name;
    level number;
    maintenance-association ma-name {
        short-name-format (character-string | vlan | 2octet | rfc-2685-vpn-id);
        continuity-check {
            hold-interval minutes;
            interval (10m | 10s | 1m | 1s | 100ms);
            loss-threshold number
        }
        mep mep-id {
            auto-discovery;
            direction (up | down);
            interface interface-name (protect | working);
            lowest-priority-defect (all-defects | err-xcon | mac-rem-err-xcon | no-defect |
                rem-err-xcon | xcon );
            priority number;
            remote-mep mep-id {
                action-profile profile-name;
                sla-iterator-profile profile-name {
                    data-tlv-size size;
                    iteration-count count-value;
                    priority priority-value;
                }
            }
        }
        mip-half-function(none | default | explicit);
        name-format (character-string | none | dns | mac+2oct);
    }
    virtual-switch name {
        bridge-domain name <vlan-id [ vlan-ids ]>;
    }
}
```

Hierarchy Level [edit protocols oam ethernet connectivity-fault-management]

Release Information Statement introduced in Junos OS Release 8.4.

Description Configure the name of the maintenance domain in IEEE-compliant format.

Options **domain-name**—Name of the maintenance domain.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Creating the Maintenance Domain
- Configuring a Maintenance Endpoint

- Example: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers

master-only

Syntax	master-only;
Hierarchy Level	[edit groups rex interfaces (fxp0 em0) unit <i>logical-unit-number</i> family <i>family</i> address], [edit groups rex logical-systems <i>logical-system-name</i> interfaces fxp0 unit <i>logical-unit-number</i> family <i>family</i> address], [edit interfaces (fxp0 em0) unit <i>logical-unit-number</i> family <i>family</i> address], [edit logical-systems <i>logical-system-name</i> interfaces fxp0 unit <i>logical-unit-number</i> family <i>family</i> address]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	Configure the IP address to be used when the Routing Engine is the current master.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring a Consistent Management IP Address• Junos OS CLI User Guide

maximum

Syntax	maximum <i>number</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> services-options session-limit]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Specify the maximum number of sessions allowed simultaneously.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

maximum-contexts

Syntax	<code>maximum-contexts <i>number</i> <force>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> compression rtp], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> compression rtp]
Release Information	Statement introduced in Junos OS Release 7.5.
Description	Specify the maximum number of RTP contexts to accept during negotiation.
Options	<p><i>number</i>—Maximum number of contexts.</p> <p><i>force</i>—(Optional) Requires the PIC to use the value specified for maximum RTP contexts, regardless of the negotiated value. This option allows the software to interoperate with Junos OS Releases that base the RTP context value on link speed.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Junos OS Services Interfaces Configuration Guide

maximum-requests

Syntax	<code>maximum-requests <i>times</i>;</code>
Hierarchy Level	[edit protocols dot1x authenticator interface <i>interface-id</i>]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Specify the maximum number of retransmission times of an EAPOL Request packet to the client before it times out the authentication session.
Options	<p><i>times</i>—Specify the maximum number of retransmission times.</p> <p>Range: 1 through 10 times</p> <p>Default: 2 times</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IEEE 802.1x Port-Based Network Access Control Overview • authenticator on page 326 • dot1x on page 405 • interface (IEEE 802.1x) on page 495

maximum-vcs

Syntax	<code>maximum-vcs <i>maximum-vcs</i>;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options vpi <i>vpi-identifier</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM1 interfaces, configure the maximum number of virtual circuits (VCs) allowed on a virtual path (VP). When configuring ATM1 interfaces on the router, you must include this statement.</p> <p>For a configured virtual path identifier (VPI), valid virtual channel identifier (VCI) numbers are from 0 through (<i>maximum-vcs</i> value – 1). VCI numbers 0 through 31 are reserved by the ATM Forum. It is recommended that you use a VCI number higher than 31 when connecting to an ATM switch.</p>
Options	<p><i>maximum-vcs</i>—Maximum number of VCs on the VP.</p> <p>Range: 1 through 4090</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring the Maximum Number of ATM1 VCs on a VP• multipoint-destination on page 582• promiscuous-mode on page 657• vci on page 785

max-sessions (PPPoE Service Name Tables)

Syntax	<code>max-sessions <i>number</i>;</code>
Hierarchy Level	<code>[edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i>],</code>
Release Information	Statement introduced in Junos OS Release 10.2.
Description	<p>Configure the maximum number of active PPPoE sessions using either static or dynamic PPPoE interfaces that the router can establish with the specified named service, empty service, or any service entry in a PPPoE service name table. The router maintains a count of active PPPoE sessions for each service entry to determine when the maximum sessions limit has been reached.</p> <p>The router uses the max-sessions value for a PPPoE service name table entry in conjunction with the max-sessions value configured for the PPPoE underlying interface, and with the maximum number of PPPoE sessions supported on your router. If your configuration exceeds any of these maximum session limits, the router is unable to establish the PPPoE session.</p>
Options	<p><i>number</i>—Maximum number of active PPPoE sessions that the router can establish with the specified PPPoE service name table entry, in the range 1 to the platform-specific maximum PPPoE sessions supported for your router. The default value is equal to the maximum number of PPPoE sessions supported on your routing platform.</p> <p>Range: Specify the range according to the PIC type and router.</p> <p>For Intelligent Queuing 2 (IQ2) PICs on M120 and M320 Series routers, 1 through 16000.</p> <p>For Trio MPC/MIC interfaces on MX Series routers, 1 through 64000.</p> <p>Default: The default value is determined by the PIC type and router.</p> <p>For Intelligent Queuing 2 (IQ2) PICs on M120 and M320 Series routers, 16000.</p> <p>For Trio MPC/MIC interfaces on MX Series routers, 64000.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring PPPoE Service Name Tables Limiting the Number of Active PPPoE Sessions Established with a Specified Service Name max-sessions (Dynamic PPPoE)

mc-ae

Syntax	<pre>mc-ae { chassis-id <i>chassis-id</i>; mc-ae-id <i>mc-ae-id</i>; mode (active-active active-standby); redundancy-group <i>group-id</i>; status-control (active standby); }</pre>
Hierarchy Level	[edit interfaces aeX aggregated-ether-options]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	MC-LAG allows one device to form a logical LAG interface with two or more other devices.
Options	<p>chassis-id—Specify the chassis ID for LACP to calculate the port number of MC-LAG physical member links.</p> <p>mc-ae-id—Specify the identification number of MC-LAG device. The two MC-LAG network devices that manage a given MC-LAG must have the same mc-lag-id.</p> <p>mode (active-active active-standby)—Specify that MC-LAG is active-active or active-standby.</p> <p>redundancy-group—Specify the redundancy group identification number. The Inter-Chassis Control Protocol (ICCP) uses the redundancy group ID to associate multiple chassis that perform similar redundancy functions.</p> <p>status-control—Specify if the chassis must be active when both the chassis boot simultaneously. The status control is applicable only if the mode active-standby statement is also included.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Multichassis Link Aggregation

measurement-type

Syntax	<code>measurement-type (loss statistical-loss-measurement two-way-delay);</code>
Hierarchy Level	<code>[edit protocols oam ethernet connectivity-fault-management performance-monitoring sla-iterator-profiles <i>profile-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 11.1. The statistical-loss-measurement option introduced in Junos OS Release 11.2.
Description	Configure the measurement type for the service level agreement (SLA) frames. An SLA frame is a type of packet used to measure frame loss in Ethernet connections.
Options	<p>loss—Use Y.1731-compliant line module (LM) frames to measure frame loss.</p> <p>statistical-loss-measurement— Use Y.1731-compliant two-way data module (DM) frames to statistically measure frame loss.</p> <p>two-way-delay—Use Y.1731-compliant two-way DM frames to measure frame loss.</p>
Required Privilege Level	<p>Configure—To enter configuration mode.</p> <p>Control—To modify any configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring an Iterator Profile

member-interface-speed

Syntax	<code>member-interface-speed <i>speed</i>;</code>
Hierarchy Level	<code>[edit interfaces container-options member-interface-type]</code>
Release Information	Statement introduced in Junos OS Release 9.2.
Description	Specify container-interface member-interface speed options.
Options	speed —Set interface speed to OC3, OC12, OC48, OC192, OC768, or mixed.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Container Interfaces container-options on page 369

member-interface-type

Syntax	<pre>member-interface-type sonet { member-interface-speed [<i>speed</i>]; }</pre>
Hierarchy Level	[edit interfaces container-options]
Release Information	Statement introduced in Junos OS Release 9.2.
Description	Specify container-interface member-interface type as sonet and speed options.
Options	<p>sonet—Protocol type of the container interface, specify sonet.</p> <p>speed—Set interface speed to OC3, OC12, OC48, OC192, OC768, or mixed.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring Container Interfaces• container-options on page 369


mep

Syntax	<pre> mep <i>mep-id</i> { auto-discovery; direction (up down); interface <i>interface-name</i> (protect working); priority <i>number</i>; remote-mep <i>mep-id</i> { action-profile <i>profile-name</i>; sla-iterator-profile <i>profile-name</i> { data-tlv-size <i>size</i>; iteration-count <i>count-value</i>; priority <i>priority-value</i>; } } } </pre>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>md-name</i> maintenance-association <i>ma-name</i>]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	The numeric identifier of the maintenance association end point (MEP) within the maintenance association.
Options	<p>mep-id—Specify the numeric identifier of the MEP.</p> <p>Range: 1 through 8191</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring a Maintenance Endpoint Example: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers

minimum-links

Syntax	<code>minimum-links <i>number</i>;</code>
Hierarchy Level	[edit interfaces <i>aex</i> aggregated-ether-options], [edit interfaces <i>aex</i> aggregated-sonet-options], [edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit interfaces interface-range <i>range</i> aggregated-ether-options], [edit interfaces interface-range <i>range</i> aggregated-sonet-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	For aggregated Ethernet, SONET/SDH, multilink, link services, and voice services interfaces only, set the minimum number of links that must be up for the bundle to be labeled up.
Options	<i>number</i> —Number of links. Range: 1 through 8 (1 through 16 for Ethernet and SONET interfaces on the MX Series, M320, M120, T Series, or TX Matrix routers, and 1 through 12 for EX8200 switches) Default: 1
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Aggregated Ethernet Minimum Links• Configuring Aggregated SONET/SDH Minimum Links• Configuring Aggregated Ethernet Interfaces (CLI Procedure)• Example: Configuring Aggregated Ethernet High-Speed Uplinks Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch• Junos OS Services Interfaces Configuration Guide

mip-half-function

Syntax	mip-half-function (none default explicit);
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-managementmaintenance-domain md-name], [edit protocols oam ethernet connectivity-fault-managementmaintenance-association ma-name]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Specify the OAM Ethernet CFM maintenance domain MIP half functions.
	<div>  <p>NOTE: Whenever a MIP is configured and a bridge domain is mapped to multiple maintenance domains or maintenance associations, it is essential that the mip-half-function value for all maintenance domains and maintenance associations are the same.</p> </div>
Options	<p>none—Specify to not use the mip-half-function.</p> <p>default—Specify to use the default mip-half-function.</p> <p>explicit—Specify an explicit mip-half-function.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Creating the Maintenance Domain Example: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers maintenance-domain on page 561

mlfr-uni-nni-bundle-options

Syntax mlfr-uni-nni-bundle-options {
 acknowledge-retries *number*;
 acknowledge-timer *milliseconds*;
 action-red-differential-delay (disable-tx | remove-link);
 drop-timeout *milliseconds*;
 fragment-threshold *bytes*;
 hello-timer *milliseconds*;
 link-layer-overhead *percent*;
 lmi-type (ansi | itu);
 minimum-links *number*;
 mrru *bytes*;
 n391 *number*;
 n392 *number*;
 n393 *number*;
 red-differential-delay *milliseconds*;
 t391 *seconds*;
 t392 *number*;
 yellow-differential-delay *milliseconds*;
 }

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure link services and voice services interface management properties.

 The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

Related Documentation • [Junos OS Services Interfaces Configuration Guide](#)

mode

Syntax	<code>mode loose;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family (inet inet6) rpf-check], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family (inet inet6) rpf-check]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Check whether the packet has a source address with a corresponding prefix in the routing table. If a corresponding prefix is not found, unicast reverse path forwarding (RPF) loose mode does not accept the packet. Unlike strict mode, loose mode does not check whether the interface expects to receive a packet with a specific source address prefix.
Default	If you do not include this statement, unicast RPF is in strict mode.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Unicast RPF Strict Mode on page 213

modem-options

Syntax	<pre>modem-options { dialin (console routable); init-command-string <i>initialization-command-string</i>; }</pre>
Hierarchy Level	[edit interfaces umd0]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	For J Series Services Routers, configure a USB port to act as a USB modem. The remaining statement is explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Specifying a USB Modem Interface on J Series Routers on page 102

monitor-session

Syntax	<code>monitor-session (<i>interface-name</i> all);</code>
Hierarchy Level	[edit protocols ppp]
Release Information	Statement introduced in Junos OS Release 7.5.
Description	Monitor PPP packet exchanges. When monitoring is enabled, packets exchanged during a session are logged to the default log of <code>/var/log/pppd</code> .
Default	If you do not include this statement, no PPPD-specific monitoring operations are performed.
Options	all —Monitor PPP packet exchanges on all sessions. <i>interface-name</i> —Logical interface name on which to enable session monitoring.
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Monitoring a PPP Session on page 128



mpls

Syntax	<pre>mpls { pop-all-labels { required-depth <i>number</i>; } }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options], [edit interfaces <i>interface-name</i> sonet-options], [edit interfaces <i>interface-name</i> fastether-options], [edit interfaces <i>interface-name</i> gigether-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For passive monitoring on ATM and SONET/SDH interfaces and 10-Gigabit Ethernet interfaces in WAN PHY mode, process incoming IP packets that have MPLS labels. The remaining statements are explained separately.
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Removing MPLS Labels from Incoming PacketsRemoving MPLS Labels from Incoming PacketJunos OS Services Interfaces Configuration Guide

mrru

Syntax	<code>mrru bytes;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For multilink, link services, voice services, and J Series Services Routers ISDN interfaces only, set the maximum received reconstructed unit (MRRU). The MRRU is similar to the MTU, but is specific to multilink interfaces.
Options	bytes —MRRU size. Range: 1500 through 4500 bytes Default: 1500 bytes
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring ISDN Logical Interface Properties mtu on page 576 Junos OS Services Interfaces Configuration Guide

mtu

Syntax	<code>mtu bytes;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i>],</code> <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>],</code> <code>[edit interfaces interface-range <i>name</i>],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>]</code>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p>
Description	<p>Specify the maximum transmission unit (MTU) size for the media or protocol. The default MTU size depends on the device type. Changing the media MTU or protocol MTU causes an interface to be deleted and added again.</p> <p>On EX Series switches, keep the following points in mind if you are configuring MTU size for jumbo frames on these special types of interfaces:</p> <ul style="list-style-type: none"> • For LAG interfaces—Configuring the jumbo MTU size on a link aggregation group (LAG) interface (aex) automatically configures the jumbo MTU size on the member links. • For RVIs—Jumbo frames of up to 9216 bytes are supported on the routed VLAN interface (RVI), which is named vlan. The RVI functions as a logical router. To route jumbo data packets on the RVI, you must configure the jumbo MTU size on the member physical interfaces of the RVI and not on the RVI itself (the vlan interface). However, for jumbo control packets—for example, to ping the RVI with a packet size of 6000 bytes or more—you must explicitly configure the jumbo MTU size on the interface named vlan (the RVI).
	<div>  <p>CAUTION: For EX Series switches, setting or deleting the jumbo MTU size on the RVI (the vlan interface) while the switch is transmitting packets might result in dropped packets.</p> </div>
	<div>  <p>NOTE: Not all devices allow you to set an MTU value, and some devices have restrictions on the range of allowable MTU values. You cannot configure an MTU for management Ethernet (fxp0, or em0, or me0) interfaces or for loopback, multilink, and multicast tunnel devices.</p> </div>
Options	<p>bytes—MTU size.</p> <p>Range: 256 through 9192 bytes</p>

For more information on configuring MTU for specific interfaces and router or switch combinations, see “Configuring the Media MTU” on page 106.

Default: 1500 bytes (INET, INET6, and ISO families), 1448 bytes (MPLS), 1514 bytes (EX Series interfaces)

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring the Media MTU on page 106
- Configuring Gigabit Ethernet Interfaces (CLI Procedure)
- Configuring Routed VLAN Interfaces (CLI Procedure)
- Setting the Protocol MTU on page 195

multi-chassis-protection

Syntax

```
multi-chassis-protection {
  peer a.b.c.d {
    interface interface-name;
  }
}
```

Hierarchy Level [edit interfaces *interface-name*]

Description For MX Series routers with multichassis aggregated Ethernet (MC-AE) interfaces, use this statement under the physical interface level to reduce the configuration at the logical interface level. If the Inter-Chassis Control Protocol (ICCP) connection is UP and the interchassis data link (ICL) comes UP, the router configured as standby will bring up the MC-AE interfaces shared with the peer.

The remaining statements are explained separately.

Options *interface interface-name*—Specify the interface: *interface interface-name-fpc/pic/port*

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Multichassis Link Aggregation
- Configuring Active-Active Bridging and VRRP over IRB in Multichassis Link Aggregation on MX Series Routers
- Configuring Aggregated Ethernet Link Protection
- Example: Configuring Aggregated Ethernet Link Protection
- *peer* on page 626

multicast-dlci

Syntax	<code>multicast-dlci <i>dlci-identifier</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For point-to-multipoint Frame Relay, link services, and voice services interfaces only, enable multicast support on the interface. You can configure multicast support on the interface if the Frame Relay switch performs multicast replication.
Options	<i>dlci-identifier</i> —DLCI identifier, a number from 16 through 1022 that defines the Frame Relay DLCI over which the switch expects to receive multicast packets for replication.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring a Multicast-Capable Frame Relay Connection• dlci on page 402• multipoint-destination on page 582• Junos OS Services Interfaces Configuration Guide

multicast-only

Syntax	<code>multicast-only;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the unit and family so that it can transmit and receive multicast traffic only. You can configure this property on the IP family only.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Protocol Family on page 180• Junos OS Services Interfaces Configuration Guide• tunnel on page 767

multicast-router-interface

Syntax	multicast-router-interface;
Hierarchy Level	[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface <i>interface-name</i>], [edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan <i>vlan-id</i> interface <i>interface-name</i>], [edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface <i>interface-name</i>], [edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols vlan <i>vlan-id</i> igmp-snooping interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Configure an interface as a bridge interface toward other multicast routers.
Default	The interface can either be a host-side or multicast-router interface.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Example: Configuring IGMP Snooping • host-only-interface • IGMP Snooping in MC-LAG Active-Active on MX Series Routers Overview

multicast-statistics

Syntax	multicast-statistics;
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 10.2.
Description	For Ethernet, SONET, aggregated Ethernet, and aggregated SONET interfaces in T Series or TX Matrix routers, specify support for multicast statistics on a physical interface to enable multicast accounting for all the logical interfaces below the physical interface.
Default	not enabled—must be configured to enable
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Multicast Statistics Collection on Aggregated Ethernet Interfaces • Configuring Multicast Statistics Collection on Aggregated SONET Interfaces • Configuring Multicast Statistics Collection on Ethernet Interfaces • Configuring Multicast Statistics Collection on SONET Interfaces

multicast-vci

Syntax	<code>multicast-vci vpi-identifier.vci-identifier;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM encapsulation only, and for point-to-multipoint ATM logical interfaces only, enable the support of multicast on the interface. You can configure multicast support on the interface if the ATM switch performs multicast replication.
Options	<p><i>vci-identifier</i>—ATM virtual circuit identifier. Range: 0 through 16,384</p> <p><i>vpi-identifier</i>—ATM virtual path identifier. Range: 0 through 255 Default: 0</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring a Multicast-Capable ATM1 or ATM2 IQ Connectionmultipoint-destination on page 582vci on page 785

multilink-max-classes

Syntax	<code>multilink-max-classes <i>number</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Adaptive Services (AS) PIC link services IQ interfaces (lsq) only, configure the number of multilink classes to be negotiated when a link joins the bundle.
Options	<i>number</i> —The number of multilink classes to be negotiated when a link joins the bundle. Range: 1 through 8 Default: None
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Junos OS Services Interfaces Configuration Guide • multipoint on page 581

multipoint

Syntax	<code>multipoint;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the interface unit as a multipoint connection.
Default	If you omit this statement, the interface unit is configured as a point-to-point connection.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring a Multipoint Connection on page 165 • point-to-point on page 633

multipoint-destination

Syntax	<pre>multipoint-destination address dlcidlcid-identifier; multipoint-destination address { epd-threshold cells; inverse-arp; oam-liveness { down-count cells; up-count cells; } oam-period (disable seconds); shaping { (cbr rate rtvbr peak rate sustained rate burst length vbr peak rate sustained rate burst length); queue-length number; } vci vpi-identifier.vci-identifier; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	For point-to-multipoint Frame Relay or ATM interfaces only, enable the support of multicast on the interface. You can configure multicast support on the interface if the Frame Relay or ATM switch performs multicast replication.
Options	<p>address—Address of the remote side of the point-to-multipoint connection.</p> <p>dlci-identifier—For Frame Relay interfaces, the data-link connection identifier. Range: 0 through 0xFFFFFFF (24 bits)</p> <p>vci-identifier—For ATM interfaces, the virtual circuit identifier. Range: 0 through 16,384</p> <p>vpi-identifier—For ATM interfaces, the virtual path identifier. Range: 0 through 255 Default: 0</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring a Point-to-Point ATM1 or ATM2 IQ ConnectionConfiguring a Point-to-Multipoint Frame Relay Connectiondlci on page 402

- [encapsulation \(Logical Interface\) on page 421](#)

multiservice-options

Syntax	<pre> multiservice-options { (syslog no-syslog); (core-dump no-core-dump); (dump-on-flow-control); flow-control-options { down-on-flow-control; dump-on-flow-control; reset-on-flow-control; } } </pre>
Hierarchy Level	[edit interfaces <i>mo-fpc/pic/port</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For monitoring services interfaces only, configure multiservice-specific interface properties.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Multiservice Physical Interface Properties on page 147 • Junos OS Services Interfaces Configuration Guide • passive-monitor-mode on page 620

n391

Syntax	n391 <i>number</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For link services and voice services interfaces only, set the Frame Relay full status polling interval.
Options	<i>number</i> —Polling interval. Range: 1 through 255 Default: 6
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide• n392 on page 585• n393 on page 586• timeslots on page 744• t392 on page 737

n392

Syntax	n392 <i>number</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For link services and voices interfaces only, set the Frame Relay error threshold, in number of errors.
Options	<i>number</i> —Error threshold. Range: 1 through 10 Default: 3
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide• n391 on page 584• n393 on page 586• timeslots on page 744• t392 on page 737

n393

Syntax	n393 <i>number</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For link services and voices interfaces only, set the Frame Relay monitored event count.
Options	<i>number</i> —Number of event count. Range: 1 through 255 Default: 6
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide• n391 on page 584• n392 on page 585• timeslots on page 744• t392 on page 737

name-format

Syntax	name-format (character-string none dns mac+2oct);
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain domain-name]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	Specify the format of the maintenance domain name.
Options	<p>character-string—The name is an ASCII character string.</p> <p>none—Name format none means that maintenance domain name is not used.</p> <p>dns—Name is in domain name service (DNS) format. For example: www.juniper.net.</p> <p>mac+2octet—Name is the MAC address plus a two-octet maintenance association identifier. For example: 08:00:22:33:44:55.100.</p> <p>Default: character-string</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Creating a Maintenance Association

native-vlan-id

Syntax	<code>native-vlan-id <i>number</i>;</code>
Hierarchy Level	[edit interfaces <i>ge-fpc/pic/port</i>]
Release Information	Statement introduced in Junos OS Release 8.3.
Description	<p>For 1-, 4-, and 8-port Gigabit Ethernet IQ2 and IQ2-E PICs, for 1-port 10-Gigabit Ethernet IQ2 and IQ2-E PICs configured for 802.1Q flexible VLAN tagging, for all Ethernet interfaces on MX Series routers, and for aggregated Ethernet interfaces on IQ2 and IQ2-E PICs or MX Series DPCs, configure mixed tagging support for untagged packets on a port. When the native-vlan-id statement is included with the flexible-vlan-tagging statement, untagged packets are accepted on the same mixed VLAN-tagged port.</p> <p>The logical interface on which untagged packets are received must be configured with the same native VLAN ID as that configured on the physical interface. To configure the logical interface, include the vlan-id statement (matching the native-vlan-id statement on the physical interface) at the [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>] hierarchy level.</p> <p>When the native-vlan-id statement is included with the interface-mode the statement, untagged packets are accepted and forwarded within the bridge domain that is configured with the matching VLAN ID.</p>
Options	<i>number</i> —VLAN ID number.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Mixed Tagging Support for Untagged PacketsConfiguring a Logical Interface for Access Modeflexible-vlan-tagging on page 449

ncp-max-conf-req

Syntax	<code>ncp-max-conf-req <i>number</i></code>
Hierarchy Level	[edit interfaces <i>so-fpc/pic/port</i> unit <i>number</i> ppp-options]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Set the maximum number of NCP Configure-Requests to be sent, after which the router goes to NCP down state.
Options	<p><i>number</i>—Ranges from 0 to 65535, where 0 means send infinite NCP Configure-Requests and any other value specifies the maximum number NCP Configure-Requests to send and then stop sending.</p> <p>Range: 0 through 65,535</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring the NCP Configure-Request Maximum Sent on page 169 ppp-options on page 646

ncp-restart-timer

Syntax	<code>ncp-restart-timer <i>milliseconds</i>;</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options]</p>
Release Information	Statement introduced in Junos OS Release 8.1.
Description	For interfaces with PPP and PPP TCC encapsulations and on multilink PPP bundle interfaces, configure a restart timer for the Network Control Protocol (NCP) component of a PPP session.
Options	<p><i>milliseconds</i>—The time in milliseconds between successive NCP configuration requests.</p> <p>Range: 500 through 10,000 milliseconds</p> <p>Default: 3 seconds</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring the PPP Restart Timers on page 170

negotiate-address

Syntax	negotiate-address;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For interfaces with PPP encapsulation, enable the interface to be assigned an IP address by the remote end.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring IPCP Options on page 187• address on page 306• unnumbered-address (PPP) on page 779• Junos OS System Basics Configuration Guide

negotiation-options

Syntax	negotiation-options { allow-remote-loopback; no-allow-link-events; }
Hierarchy Level	[edit protocols oam link-fault-management interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	Enable and disable IEEE 802.3ah Operation, Administration, and Management (OAM) features for Ethernet interfaces. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IEEE 802.3ah OAM Link-Fault Management Overview

neighbor

Syntax	<code>neighbor address;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>If you are configuring one router to be the working router and a second to be the protect router, configure the address of the remote interface. You configure this on one or both of the interfaces.</p> <p>The address you specify for the neighbor must never be routed through the interface on which APS is configured, or instability will result. We strongly recommend that you directly connect the working and protect routers and that you configure the interface address of this shared network as the neighbor address.</p>
Options	<i>address</i> —Neighbor's address.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Basic APS Support

no-allow-link-events

Syntax	<code>no-allow-link-events;</code>
Hierarchy Level	[edit protocols oam ethernet link-fault-management interface <i>interface-name</i> negotiation-options]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	Disable the sending of link event TLVs.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Disabling the Sending of Link Event TLVs

no-auto-mdix

Syntax	no-auto-mdix;
Hierarchy Level	[edit interface <i>ge-fpc/port/pic</i> gigether-options]
Description	<p>On MX Series routers, disable the Auto MDI/MDIX feature.</p> <p>MX Series routers with Gigabit Ethernet interfaces automatically detect MDI and MDIX port connections. Use this statement to override the default setting. Remove this statement to return to the default setting.</p>
Default	Auto MDI/MDIX is enabled by default.
Options	There are no options for this statement.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Ethernet Interfaces Overviewgigether-options on page 461.

no-gratuitous-arp-request

Syntax	no-gratuitous-arp-request;
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 9.6 for EX Series switches.
Description	For Ethernet interfaces, do not respond to gratuitous ARP requests.
Default	Gratuitous ARP responses are enabled on all Ethernet interfaces.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Gratuitous ARPgratuitous-arp-reply on page 462

no-keepalives

Syntax	no-keepalives;
Hierarchy Level	[edit interfaces <i>interface-name</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Disable the sending of keepalives on a physical interface configured with PPP, Frame Relay, or Cisco HDLC encapsulation. The default keepalive interval is 10 seconds.</p> <p>For ATM2 IQ interfaces only, you can disable keepalives on a logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:</p> <ul style="list-style-type: none"> • atm-ppp-llc—PPP over AAL5 LLC encapsulation. • atm-ppp-vc-mux—PPP over AAL5 multiplex encapsulation.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Keepalives on page 136 • Disabling the Sending of PPPoE Keepalive Messages • Configuring Frame Relay Keepalives

no-partition

Syntax	no-partition interface-type (e1 (cau4 so) (ct3 t3) so t3);
Hierarchy Level	[edit interfaces ce1-fpc/pic/port], [edit interfaces coc1-fpc/pic/port:channel], [edit interfaces coc12-fpc/pic/port], [edit interfaces cstm1-fpc/pic/port], [edit interfaces ct3-fpc/pic/port]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For Channelized E1 IQ PICs only, configure the channelized E1 interface as an unpartitioned, clear channel.</p> <p>For Channelized OC12 PIC only, convert the channelized OC1 IQ interface into a channelized T3 interface or a T3 interface. You perform this configuration task for C-bit parity and M13-mapped configurations.</p> <p>For Channelized OC12 IQ PICs only, configure the channelized OC12 interface as an unpartitioned, clear channel.</p> <p>For Channelized STM1 PIC only, convert the channelized STM1 IQ interface into a channelized Administrative Unit 4 (AU-4) interface or a SONET/SDH STM1 interface.</p> <p>For Channelized DS3 PIC only, configure the channelized T3 interface as an unpartitioned, clear channel.</p>
Default	If you do not include either this statement or the partition statement, the Channelized IQ PIC is not partitioned, and no data channels are configured.
Options	<p>The option used must correspond to the physical interface type:</p> <p>e1—E1 interface type.</p> <p>coc12 so—Channelized OC12 interface type, in SONET mode.</p> <p>cau4—Channelized AU-4 interface type.</p> <p>cstm1—SONET/SDH STM1 interface type, in SDH mode.</p> <p>ct3—Channelized T3 interface type.</p> <p>t3—T3 interface type.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Channelized E1 IQ and IQE Interfaces Overview• Channelized OC12/STM4 IQ and IQE Interfaces Overview• Configuring an OC12/STM4 Interface

- Configuring Channelized STM1 IQ and IQE Interfaces
- Configuring T3 IQ Interfaces
- **partition on page 618**

no-pre-classifier

Syntax	no-pre-classifier;
Hierarchy Level	[edit chassis fpc <i>n</i> pic <i>n</i>]
Description	Specify disabling the control queue for all ports on the 10-Gigabit Ethernet LAN/WAN PIC. Deleting this configuration re-enables the control queue feature on all ports of the 10-Gigabit Ethernet LAN/WAN PIC.
Default	The no-pre-classifier statement is not configured and the control queue is operational.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • 10-Gigabit Ethernet LAN/WAN PIC Overview • Configuring Control Queue Disable on a 10-Gigabit Ethernet LAN/WAN PIC

no-redirects

Syntax	no-redirects;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Do not send protocol redirect messages on the interface. To disable the sending of protocol redirect messages for the entire router or switch, include the no-redirects statement at the [edit system] hierarchy level.
Default	Interfaces send protocol redirect messages.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Disabling the Transmission of Redirect Messages on an Interface on page 196 • Junos OS System Basics Configuration Guide

no-termination-request

Syntax	no-termination-request;
Hierarchy Level	[edit interfaces <i>interface-name</i> ppp-options], [edit interfaces lsq- <i>fpc/pic/port</i> lsq-failure-options]
Release Information	Statement introduced in Junos OS Release 7.4. Support at the [edit interfaces <i>interface-name</i> ppp-options] hierarchy level added in Junos OS Release 8.3.
Description	For LSQ PICs or link PICs in redundant LSQ configurations, you can inhibit the router from sending PPP termination-request messages to the remote host if the PIC fails.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Link PIC Failover on Channelized OC3 IQ and IQE Interfaces• Configuring Link PIC Failover on Channelized OC12/STM4 IQ and IQE Interfaces• Configuring Link PIC Failover on Channelized STM1 Interfaces• Junos OS Services Interfaces Configuration Guide

node-id

Syntax	node-id <i>mac-address</i> ;
Hierarchy Level	[edit protocols protection-group ethernet-ring <i>ring-name</i>]
Release Information	Statement introduced in Junos OS Release 9.4.
Description	Optionally specify the MAC address of a node in the protection group. If this statement is not included, the router assigns the node's MAC address.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Ethernet Ring Protection Switching Overview

non-revertive

Syntax	non-revertive;
Hierarchy Level	[edit interfaces aeX aggregated-ether-options lacp link-protection]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Disable the ability to switch to a better priority link (if one is available) once a link is established as active and collection distribution is enabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• link-protection on page 531• Configuring Aggregated Ethernet Link Protection

oam

```

Syntax  oam {
    ethernet {
        connectivity-fault-management {
            action-profile profile-name {
                default-actions {
                    interface-down;
                }
            }
        }
        performance-monitoring {
            delegate-server-processing;
            hardware-assisted-timestamping;
            sla-iterator-profiles {
                profile-name {
                    disable;
                    calculation-weight {
                        delay delay-weight;
                        delay-variation delay-variation-weight;
                    }
                    cycle-time milliseconds;
                    iteration-period connections;
                    measurement-type (loss | statistical-frame-loss | two-way-delay);
                }
            }
        }
        linktrace {
            age (30m | 10m | 1m | 30s | 10s);
            path-database-size path-database-size;
        }
        maintenance-domain domain-name {
            level number;
            name-format (character-string | none | dns | mac+2octet);
            maintenance-association ma-name {
                short-name-format (character-string | vlan | 2octet | rfc-2685-vpn-id);
                continuity-check {
                    convey-loss-threshold;
                    hold-interval minutes;
                    interface-status-tlv;
                    interval (10m | 10s | 1m | 1s | 100ms);
                    loss-threshold number;
                    port-status-tlv;
                }
            }
            mep mep-id {
                auto-discovery;
                direction (up | down);
                interface interface-name (protect | working);
                lowest-priority-defect (all-defects | err-xcon | mac-rem-err-xcon | no-defect |
                    rem-err-xcon | xcon );
                priority number;
                remote-mep mep-id {
                    action-profile profile-name;
                    sla-iterator-profile profile-name {
                        data-tlv-size size;
                    }
                }
            }
        }
    }
}

```

```

        iteration-count count-value;
        priority priority-value;
    }
}
}
}
}
link-fault-management {
    action-profile profile-name {
        action {
            link-down;
            send-critical-event;
            syslog;
        }
        event {
            link-adjacency-loss;
            link-event-rate {
                frame-error count;
                frame-period count;
                frame-period-summary count;
                symbol-period count;
            }
            protocol-down;
        }
    }
}
interface interface-name {
    apply-action-profile
    link-discovery (active | passive);
    pdu-interval interval;
    pdu-threshold threshold-value;
    remote-loopback;
    event-thresholds {
        frame-error count;
        frame-period count;
        frame-period-summary count;
        symbol-period count;
    }
    negotiation-options {
        allow-remote-loopback;
        no-allow-link-events;
    }
}
}
}
}
}

```

Hierarchy Level [edit protocols]

Release Information Statement introduced in Junos OS Release 8.2.

Description For Ethernet interfaces on M320, M120, MX Series, and T Series routers, provide IEEE 802.3ah Operation, Administration, and Management (OAM) support.

The remaining statements are explained separately.

Required Privilege interface—To view this statement in the configuration.
Level interface-control—To add this statement to the configuration.

Related Documentation

- IEEE 802.3ah OAM Link-Fault Management Overview

oam-liveness

Syntax

```
oam-liveness {  
    down-count cells;  
    up-count cells;  
}
```

Hierarchy Level

[edit interfaces *interface-name* atm-options vpi *vpi-identifier*],
[edit interfaces *interface-name* unit *logical-unit-number*],
[edit interfaces *interface-name* unit *logical-unit-number* family *family* address *address* multipoint-destination *address*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family* address *address* multipoint-destination *address*]

Release Information

Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 11.1 for the QFX Series.

Description

For ATM encapsulation only, configure Operation, Administration, and Maintenance (OAM) F5 loopback cell count thresholds. Not supported on ATM-over-SHDSL interfaces.

For ATM2 IQ PICs only, configure OAM F4 loopback cell count thresholds at the [edit interfaces *interface-name* atm-options vpi *vpi-identifier*] hierarchy level.

Options

down-count *cells*—Minimum number of consecutive OAM F4 or F5 loopback cells lost before a VC is declared down.

Range: 1 through 255

Default: 5 cells

up-count *cells*—Minimum number of consecutive OAM F4 or F5 loopback cells received before a VC is declared up.

Range: 1 through 255

Default: 5 cells

Required Privilege interface—To view this statement in the configuration.
Level interface-control—To add this statement to the configuration.

Related Documentation

- Configuring the ATM OAM F5 Loopback Cell Threshold

oam-period

Syntax	<code>oam-period (disable seconds);</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i> multipoint-destination <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i> multipoint-destination <i>address</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p>
Description	<p>For ATM encapsulation only, configure the OAM F5 loopback cell period. Not supported on ATM-over-SHDSL interfaces.</p> <p>For ATM2 IQ PICs only, configure the OAM F4 loopback cell period at the [edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i>] hierarchy level.</p>
Default	If you omit this statement, OAM F5 loopback cells are not initiated, but the interface still responds if it receives OAM F5 loopback cells.
Options	<p>disable—Disable the OAM loopback cell transmit feature.</p> <p>seconds—OAM loopback cell period.</p> <p>Range: 1 through 900 seconds</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Defining the ATM OAM F5 Loopback Cell Period

oc-slice

Syntax	<code>oc-slice <i>oc-slice-range</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> partition <i>partition-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For channelized OC12 IQ interfaces only, configure the range of SONET/SDH slices.
Default	If you do not include either this statement or the no-partition statement, the Channelized OC12 IQ PICs not partitioned, and no data channels are configured.
Options	<p><i>oc-slice-range</i>—Range of SONET/SDH slices. OC3 interfaces must occupy three consecutive OC slices per interface, in the form 1–3, 4–6, 7–9, or 10–12. The T3, T1, and DS0 interface types each occupy one OC slice per interface.</p> <p>Range: For OC3 interfaces, 1–3, 4–6, 7–9, or 10–12; for SONET/SDH and T3 interfaces, 1–12</p> <p>The remaining statement is explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Channelized OC12/STM4 IQ and IQE Interfaces Overview

open-timeout

Syntax	<code>open-timeout <i>seconds</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> services-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure timeout period for Transmission Control Protocol (TCP) session establishment.
Options	<p><i>seconds</i>—Timeout period in seconds.</p> <p>Range: 4 through 86,400 seconds</p> <p>Default: 30 seconds</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Junos OS Services Interfaces Configuration Guide


operating-mode

Syntax	<code>operating-mode <i>mode</i>;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> dsl-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For J Series Services Routers only, modify the operating mode of the digital subscriber line for an ATM interface.
Options	<p><i>mode</i>—Operating mode for ATM-over-ADSL interfaces. The mode can be one of the following:</p> <ul style="list-style-type: none"> • adsl2plus—Set the ADSL line to train in the ITU G.992.5 mode. • ansi-dmt—Set the ADSL line to train in the ANSI T1.413 Issue 2 mode. • auto—Set the ADSL line to autonegotiate the setting to match the setting of the DSL access multiplexer (DSLAM) located at the central office. The ADSL line trains in the ANSI T1.413 Issue 2 (ansi-dmt) or ITU G.992.1 (itu-dmt) mode. • etsi—Set the ADSL line to train in the ETSI TS 101 388 V1.3.1 mode. • itu-annexb-ur2—Set the ADSL line to train in the ITU G.992.1 UR-2 mode. • itu-annexb-non-ur2—Set the ADSL line to train in the ITU G.992.1 non-UR-2 mode. • itu-dmt—Set the ADSL line to train in the ITU G.992.1 mode. • itu-dmt-bis—Set the ADSL line to train in the ITU G.992.3 mode. <p>Default: <code>auto</code></p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • ATM-over-ADSL Overview • <i>Junos OS Interfaces and Routing Configuration Guide</i>

optics-options

Syntax	<pre>optics-options { alarm low-light-alarm { (link-down syslog); } warning low-light-warning { (link-down syslog); } wavelength <i>nm</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. alarm option and warning options introduced in Junos OS Release 10.0.
Description	For 10-Gigabit Ethernet dense wavelength-division multiplexing (DWDM) interfaces only, configure full C-band International Telecommunication Union (ITU)-Grid tunable optics.
Options	The alarm and warning and wavelength statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">10-Gigabit Ethernet DWDM Interface Wavelength Overview

option-82

Syntax	option-82;
Hierarchy Level	[edit interfaces <i>interface-name</i> auto-configure vlan-ranges authentication username-include], [edit interfaces <i>interface-name</i> auto-configure stacked-vlan-ranges authentication username-include],
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Specify the option 82 that is concatenated with the username during the subscriber authentication process.
	<div><p>NOTE: The option 82 value used in creating the username is based on the option 82 value that is encoded in the incoming DHCP discover packet.</p></div>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring VLAN Interface Username Information for AAA Authentication

otn-options

Syntax `otn-options {
 apply-groups group-name;
 apply-groups-except exception-group-name;
 fec (efec | gfec | none);
 (laser-enable | no-laser-enable);
 (line-loopback } no-line-loopback);
 pass-thru;
 rate (fixed-stuff-bytes | no-fixed-stuff-bytes | pass-thru);
 transmit-payload-type number;
 trigger (oc-lof | oc-lom | oc-los | oc-wavelength-lock | odu-ais | odu-bbe-th | odu-bdi |
 odu-es-th | odu-lck | odu-oci | odu-sd | odu-ses-th | odu-ttim | odu-uas-th | opu-ptm |
 otu-ais | otu-bbe-th | otu-bdi | otu-es-th | otu-fec-deg | otu-fec-exe | otu-iae | otu-sd |
 otu-ses-th | otu-ttim | otu-uas-th);
 tti;
 }`

Hierarchy Level [edit interfaces *ge-fpc/pic/port*]

Release Information Statement introduced in Junos OS Release 9.4.

Description Specify the Gigabit Ethernet Optical Transport Network (OTN) interface and options.

Options **apply-groups**—Groups from which to inherit configuration data.

apply-groups-except—Do not inherit configuration data from these groups.

fec—Enable Forward Error Correction (FEC) mode.

laser-enable—Enable laser.

line-loopback—Enable line loopback.

no-laser-enable—Do not enable laser.

no-line-loopback—Do not enable line loopback.

rate (options)—OTN mode:

- **fixed-stuff-bytes**—Fixed stuff bytes 11.0957 Gbps.
- **no-fixed-stuff-bytes**—No fixed stuff bytes 11.0491 Gbps.
- **pass-through**—Enable OTN passthrough mode.
- **no-pass-through**—Do not enable OTN passthrough mode.

transmit-payload-type *number*—Transmit payload type, specify from 0 through 255.

trigger—Defect triggers, specify from the following possible completions:

- **oc-lof**—OC Loss of Frame defect trigger.
- **oc-lom**—OC Loss of Multiframe defect trigger.

- **oc-los**—OC Loss of Signal defect trigger.
- **oc-wavelength-lock**—OC Wavelength Lock defect trigger.
- **odu-ais**—ODU Alarm Indication Signal defect trigger.
- **odu-bbe-th**—ODU Background Block Error Threshold defect trigger.
- **odu-bdi**—ODU Backward Defect Indication defect trigger.
- **odu-es-th**—ODU Errored Seconds Threshold defect trigger.
- **odu-lck**—ODU Locked defect trigger.
- **odu-oci**—ODU Open Connection Indication defect trigger.
- **odu-sd**—ODU Signal Degrade defect trigger.
- **odu-ses-th**—ODU Severely Errored Seconds Threshold defect trigger.
- **odu-ttim**—ODU Trail Trace Identifier Mismatch defect trigger.
- **odu-uas-th**—ODU Unavailable Seconds Threshold defect trigger.
- **opu-ptm**—OPU Payload Type Mismatch defect trigger.
- **otu-ais**—OTU Alarm Indication Signal defect trigger.
- **otu-bbe-th**—OTU Background Block Error Threshold defect trigger.
- **otu-bdi**—OTU Backward Defect Indication defect trigger.
- **otu-es-th**—OTU Errored Seconds Threshold defect trigger.
- **otu-fec-deg**—OTU FEC Degrade defect trigger.
- **otu-fec-exe**—OTU FEC Excessive Error defect trigger.
- **otu-iae**—OTU Incoming Alignment defect trigger.
- **otu-sd**—OTU Signal Degrade defect trigger.
- **otu-ses-th**—OTU Severely Errored Seconds Threshold defect trigger.
- **otu-ttim**—OTU Trail Trace Identifier Mismatch defect trigger.
- **otu-uas-th**—OTU Unavailable Seconds Threshold defect trigger.

tti—Trace identifier, select from the following options:

- **odu-dapi**—ODU Destination Access Point Identifier.
- **odu-expected-receive-dapi**—ODU Expected Receive Destination Access Point Identifier.
- **odu-expected-receive-sapi**—ODU Expected Receive Source Access Point Identifier.
- **odu-sapi**—ODU Source Access Point Identifier.
- **otu-dapi**—OTU Destination Access Point Identifier.
- **otu-expected-receive-dapi**—OTU Expected Receive Destination Access Point Identifier.
- **otu-expected-receive-sapi**—OTU Expected Receive Source Access Point Identifier.
- **otu-sapi**—OTU Source Access Point Identifier.

Required Privilege Level interfaces—To view this statement in the configuration.
interfaces-control—To add this statement to the configuration.

Related Documentation

- [Gigabit Ethernet OTN Options Configuration Overview](#)

output

Syntax output {
 service-set *service-set-name* <service-filter *filter-name*>;
 }

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* family inet service],
 [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*
 family inet service]

Release Information Statement introduced before Junos OS Release 7.4.

Description Define one or more output service sets and filters to be applied to traffic.

Options The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- [Junos OS Services Interfaces Configuration Guide](#)

output-list

Syntax	<code>output-list [<i>filter-names</i>];</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> filter], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> filter]
Release Information	Statement introduced in Junos OS Release 7.6.
Description	Apply a group of filters to evaluate when packets are transmitted on an interface.
Options	[<i>filter-names</i>]—Name of a filter to evaluate when packets are transmitted on the interface. Up to 16 filters can be included in a filter input list.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Applying a Filter to an Interface on page 208 input-list on page 490 Junos OS Routing Policy Configuration Guide Junos OS Services Interfaces Configuration Guide Junos OS System Basics Configuration Guide

output-policer

Syntax	<code>output-policer <i>policer-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> layer2-policer]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	Associate a Layer 2 policer with a logical interface. The output-policer and output-three-color statements are mutually exclusive.
Options	<i>policer-name</i> —Name of the policer that you define at the [edit firewall] hierarchy level.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Applying a Policer input-policer on page 490

output-priority-map

Syntax	<pre>output-priority-map { classifier { premium { forwarding-class <i>class-name</i> { loss-priority (high low); } } } }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> together-options ethernet-switch-profile ethernet-policer-profile]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For Gigabit Ethernet IQ and 10-Gigabit Ethernet interfaces only, define the output policer priority map to be applied to outgoing frames on this interface.</p> <p>The statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Specifying an Output Priority Map• input-priority-map on page 491

output-three-color

Syntax	<pre>output-three-color <i>policer-name</i>;</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> layer2-policer]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	Associate a Layer 2, three-color policer with a logical interface. The output-three-color and output-policer statements are mutually exclusive.
Options	<i>policer-name</i> —Name of the three-color policer that you define at the [edit firewall] hierarchy level.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Applying a Policer• input-three-color on page 491

output-vlan-map

See the following sections:

- **output-vlan-map (Aggregated Ethernet)** on page 611
- **output-vlan-map (Gigabit Ethernet IQ and 10-Gigabit Ethernet with SFPP)** on page 612

output-vlan-map (Aggregated Ethernet)

Syntax	<pre>output-vlan-map { (pop push swap); tag-protocol-id <i>tpid</i>; vlan-id <i>number</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	<p>For aggregated Ethernet interfaces using Gigabit Ethernet IQ and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces only, define the rewrite profile to be applied to outgoing frames on this logical interface.</p> <p>The statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Stacking and Rewriting Gigabit Ethernet VLAN Tags • input-vlan-map (Aggregated Ethernet) on page 492

output-vlan-map (Gigabit Ethernet IQ and 10-Gigabit Ethernet with SFPP)

Syntax	<pre>output-vlan-map { (pop pop-pop pop-swap push push-push swap swap-push swap-swap); inner-tag-protocol-id <i>tpid</i>; inner-vlan-id <i>number</i>; tag-protocol-id <i>tpid</i>; vlan-id <i>number</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4. pop-pop , pop-swap , push-push , swap-push , and swap-swap statements added in Junos OS Release 8.1.
Description	For Gigabit Ethernet IQ and 10-Port 10-Gigabit Ethernet SFPP interfaces only, define the rewrite operation to be applied to outgoing frames on this logical interface. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Stacking and Rewriting Gigabit Ethernet VLAN Tagsinput-vlan-map (Gigabit Ethernet IQ and 10-Gigabit Ethernet SFPP) on page 493

overflow

See the following sections:

- **overflow (Receive Bucket)** on page 613
- **overflow (Transmit Bucket)** on page 613

overflow (Receive Bucket)

Syntax	<code>overflow (discard tag);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> receive-bucket]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify how to handle packets that exceed the threshold for the receive leaky bucket.
Options	<p>tag—Tag, count, and process received packets that exceed the threshold.</p> <p>discard—Discard received packets that exceed the threshold. No counting is done.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Receive and Transmit Leaky Bucket Properties on page 138 • Configuring Receive and Transmit Leaky Bucket Properties on SONET/SDH Interfaces

overflow (Transmit Bucket)

Syntax	<code>overflow discard;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> transmit-bucket]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Discard packets that exceed the threshold for the transmit leaky bucket.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Receive and Transmit Leaky Bucket Properties on page 138 • Configuring Receive and Transmit Leaky Bucket Properties on SONET/SDH Interfaces

override

Syntax	<code>override tag <i>vlan-tag</i> dynamic-profile <i>profile name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> auto-configure <i>vlan-ranges</i>], [edit interfaces <i>interface-name</i> auto-configure stacked-vlan-ranges]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	Override dynamic profile assignment to individual VLANs that are already part of a previously defined VLAN range and dynamic profile.
Options	<i>vlan-tag</i> —VLAN tag that you want to override. <i>profile-name</i> —Name of the dynamic profile that you want to use when overriding the specified VLAN tag.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring VLAN Dynamic Profile OverrideConfiguring VLAN Ranges for Use with Dynamic Profiles

pado-advertise

Syntax	<code>pado-advertise;</code>
Hierarchy Level	[edit protocols pppoe]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Enable named services configured in PPPoE service name tables to be advertised in PPPoE Active Discovery Offer (PADO) control packets. By default, advertisement of named services in PADO packets is disabled.



NOTE: If you enable advertisement of named services in PADO packets, make sure the number and length of all advertised service entries does not exceed the maximum transmission unit (MTU) size of the PPPoE underlying interface.

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring PPPoE Service Name TablesEnabling Advertisement of Named Services in PADO Control Packets

paired-group

Syntax	<code>paired-group <i>group-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure load sharing between two working protect circuit pairs.
Options	<i>group-name</i> —Circuit's group name, as configured with the protect-circuit or working-circuit statement.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring APS Load Sharing Between Circuit Pairsworking-circuit on page 811

pap

Syntax	<pre>pap { access-profile <i>name</i>; default-pap-password <i>password</i>; local-name <i>name</i>; local-password <i>password</i>; passive; }</pre>
Hierarchy Level	<pre>[edit interfaces <i>interface-name</i> ppp-options], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options]</pre>
Release Information	Statement introduced in Junos OS Release 8.3.
Description	<p>Configure the Password Authentication Protocol (PAP). Use PAP authentication as a means to provide a simple method for the peer to establish its identity using a two-way handshake. This is done only upon initial link establishment.</p> <p>After the link is established, an ID and password pair is repeatedly sent by the peer to the authenticator until authentication is acknowledged or the connection is terminated.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring the PPP Challenge Handshake Authentication Protocol on page 121• Configuring PPP PAP Authentication on page 172• Tracing Operations of the pppd Process on page 128• traceoptions (PPP Process) on page 754• Junos OS System Basics Configuration Guide

pap-password

Syntax	<code>pap-password password;</code>
Hierarchy Level	[edit access profile <i>profile-name</i> client <i>client-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the Password Authentication Protocol (PAP) password.
Options	<i>password</i> —PAP password.
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring PPP PAP Authentication on page 172• chap-secret on page 356• Junos OS System Basics Configuration Guide

partition

Syntax	<code>partition <i>partition-number</i> oc-slice <i>oc-slice-range</i> interface-type <i>type</i> timeslots <i>time-slot-range</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For IQ interfaces and J Series interfaces on the Dual-Port Channelized E1 and T1PIM, configure the channelized interface partition. The partition number is correlated with the channel number. Partition and channel numbering on IQ interfaces begins with :1, not :0.
Default	If you omit this statement, the channelized PIC or PIM is not partitioned, and no data channels are configured.
Options	<p><i>partition-number</i>—Sublevel interface partition index.</p> <p>Range:</p> <ul style="list-style-type: none">• 1 through 4 for an OC3 interface on a channelized OC12 IQ interface.• 1 through 12 for a T3 interface on a channelized OC12 IQ interface.• 1 through 4 for a T3 interface on a channelized T3 IQ interface.• 1 through 28 for a T1 IQ interface on a channelized OC12 IQ or channelized T3 IQ interface.• 1 through 10 for an E1 interface on a channelized E1 IQ interface.• 1 through 30 on a channelized E1 interface.• 1 through 23 on a channelized T1 interface.• 1 through 24 for NxDS0 interfaces on either channelized OC12 IQ or channelized DS3 IQ interfaces.• 0 through 31 (with 0 reserved for framing) for NxDS0 interfaces on channelized E1 IQ interfaces. <p>The remaining statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Channelized E1 IQ and IQE Interfaces Overview• Channelized OC12/STM4 IQ and IQE Interfaces Overview• Configuring Channelized T3 IQ Interfaces• no-partition on page 594

passive

See the following sections:

- [passive \(CHAP\) on page 619](#)
- [passive \(PAP\) on page 620](#)

passive (CHAP)

Syntax	passive;
Hierarchy Level	[edit interfaces <i>interface-name</i> ppp-options chap], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options chap], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options chap]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Do not challenge the peer, but respond if challenged. If you omit this statement from the configuration, the interface always challenges its peer.</p> <p>For ATM2 IQ interfaces only, you can configure CHAP on the logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:</p> <ul style="list-style-type: none"> • atm-ppp-llc—PPP over AAL5 LLC encapsulation. • atm-ppp-vc-mux—PPP over AAL5 multiplex encapsulation.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Passive Mode on page 123 • Junos OS System Basics Configuration Guide

passive (PAP)

Syntax	<code>passive;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> ppp-options pap], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options pap], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options pap]
Release Information	Statement introduced in Junos OS Release 8.3.
Description	Initiate an authentication request when the PAP option is received from a peer. If you omit this statement from the configuration, the interface requires the peer to initiate an authentication request.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Passive Mode on page 126Junos OS System Basics Configuration Guide

passive-monitor-mode

Syntax	<code>passive-monitor-mode;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM, Ethernet, and SONET/SDH interfaces only, monitor packet flows from another router. If you include this statement in the configuration, the interface does not send keepalives or alarms, and does not participate actively on the network.</p> <p>For ATM and Ethernet interfaces, you can include this statement on the physical interface only.</p> <p>For SONET/SDH interfaces, you can include this statement on the logical interface only.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Enabling Passive Monitoring on ATM InterfacesPassive Monitoring on Ethernet Interfaces OverviewEnabling Passive Monitoring on SONET/SDH Interfacesmultiservice-options on page 583Junos OS Services Interfaces Configuration Guide

password

Syntax	<code>password <i>password-string</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> auto-configure vlan-ranges authentication], [edit interfaces <i>interface-name</i> auto-configure stacked-vlan-ranges authentication]
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Configure the password that is sent to the external AAA authentication server for subscriber VLAN or stacked VLAN interface authentication.
Options	<i>password-string</i> —Authentication password.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring an Authentication Password for VLAN or Stacked VLAN Ranges


path-database-size

Syntax	<code>path-database-size <i>path-database-size</i>;</code>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management linktrace]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Number of linktrace reply entries to be stored per linktrace request.
Options	path-database-size —Database size. Range: 1 through 255 Default: 64
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Linktrace Protocol in CFM

path-trace

Syntax	<code>path-trace <i>trace-string</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For SONET/SDH interfaces and 10-Gigabit Ethernet interfaces in WAN PHY mode, configure a path trace identifier, which is a text string that identifies the circuit.</p> <p>On SONET/SDH OC48 interfaces that are configured for channelized (multiplexed) mode (by including the no-concatenate statement at the [edit chassis fpc slot-number pic <i>pic-number</i>] hierarchy level), the bytes e1-quiet and bytes f1 options have no effect. The bytes f2, bytes z3, bytes z4, and path-trace options work correctly on channel 0 and work in the transmit direction only on channels 1, 2, and 3.</p> <p>For DS3 channels on a channelized OC12 interface, you can configure a unique path trace for each of the 12 channels. Each path trace can be up to 16 bytes. For channels on a channelized OC12 IQ interface, each path trace can be up to 64 bytes.</p>
Options	<p>trace-string—Text string that identifies the circuit. If the string contains spaces, enclose it in quotation marks. A common convention is to use the circuit identifier as the path trace identifier. If you do not configure an identifier, the Junos OS uses the system and interface names to construct the default trace-string. For all nonchannelized SONET/SDH interfaces, the default trace-string is system-name interface-name. For channelized SONET/SDH interfaces and 10-Gigabit Ethernet WAN-PHY interfaces, the default trace-string is interface-name.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">Configuring the SONET/SDH Path Trace Identifiersonet-options on page 710

payload-scrambler

Syntax	(payload-scrambler no-payload-scrambler);
Hierarchy Level	[edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> sonet-options], [edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Enable or disable HDLC scrambling on an E3, a SONET/SDH, or a T3 interface. This type of scrambling provides better link stability. Both sides of a connection must either use or not use scrambling.</p> <p>If you commit a T3 interface configuration that has HDLC payload scrambling enabled, the interface must also be configured to be compatible with the channel service unit (CSU) at the remote end of the line.</p> <p>Disable payload scrambling on an E3 interface if Digital Link compatibility mode is used.</p> <p>On a channelized OC12 interface, the sonet payload-scrambler statement is ignored. To configure scrambling on the DS3 channels on the interface, you can include the t3-options payload-scrambler statement in the configuration for each DS3 channel.</p>
	<div>  <p>NOTE: The payload-scrambler statement at the [edit interfaces <i>interface-name</i> e3-options] hierarchy level is not valid for IQE PICs.</p> </div>
Default	Payload scrambling is disabled on all E3 and T3 interfaces; it is enabled by default on E3/T3 over ATM interfaces and on SONET/SDH interfaces.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring E3 and T3 Parameters on ATM Interfaces Configuring E3 HDLC Payload Scrambling Configuring SONET/SDH HDLC Payload Scrambling Configuring T3 HDLC Payload Scrambling Examples: Configuring T3 Interfaces compatibility-mode on page 362

payload-size

Syntax	<code>payload-size bytes ;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> satop-options]
Release Information	Option introduced in Junos OS Release 9.3.
Description	Specify the satop-options payload-size in integer number of bytes.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• ATM Support on Circuit Emulation PICs Overview• satop-options on page 688

pdu-interval

Syntax	<code>pdu-interval interval;</code>
Hierarchy Level	[edit protocols oam ethernet link-fault-management interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	For Ethernet interfaces on M320, M120, MX Series, and T Series routers, specify the periodic OAM PDU sending interval for fault detection. Used for IEEE 802.3ah Operation, Administration, and Management (OAM) support.
Options	<i>interval</i> —Periodic OAM PDU sending interval. Range: 100 through 1000 milliseconds Default: 1000 milliseconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the OAM PDU Interval

pdu-threshold

Syntax	<code>pdu-threshold <i>threshold-value</i>;</code>
Hierarchy Level	<code>[edit protocols oam ethernet link-fault-management interface <i>interface-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 8.2.
Description	For Ethernet interfaces on M320, M120, MX Series, and T Series routers, specify the number of OAM PDUs to miss before an error is logged. Used for IEEE 802.3ah Operation, Administration, and Management (OAM) support.
Options	<i>threshold-value</i> —The number of PDUs missed before declaring the peer lost. Range: 3 through 10 PDUs Default: 3 PDUs
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the OAM PDU Threshold

peer

Syntax	<pre>peer a.b.c.d { interface <i>interface-name</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> multi-chassis-protection]
Description	For MX Series routers with multichassis aggregated Ethernet (MC-AE) interfaces, use the multi-chassis-protection statement under the physical interface level to reduce the configuration at the logical interface level. If the interchassis control protocol connection (ICCP) is UP and the interchassis data link (ICL) comes UP, the router configured as standby will bring up the MC-AE interfaces shared with the peer active-active node specified by the peer statement. You must also specify the peer's physical interface.
Options	<p><i>a.b.c.d</i>—Specify the IP address of the peer.</p> <p>interface <i>interface-name</i>—Specify the peer's physical interface: interface <i>interface-name-fpc/pic/port</i></p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Multichassis Link Aggregation• Configuring Active-Active Bridging and VRRP over IRB in Multichassis Link Aggregation on MX Series Routers• Configuring Aggregated Ethernet Link Protection• Example: Configuring Aggregated Ethernet Link Protection• multi-chassis-protection on page 577

peer-unit

Syntax	<code>peer-unit <i>unit-number</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure a peer relationship between two logical systems.
Options	<i>unit-number</i> —Peering logical system unit number.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

per-unit-scheduler

Syntax	<code>per-unit-scheduler;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For channelized OC3 IQ, channelized OC12 IQ, channelized STM1 IQ, channelized T3 IQ, channelized E1 IQ, E3 IQ, link services IQ interfaces (lsq-), link services (ls-) on J Series routers, Gigabit Ethernet IQ, Gigabit Ethernet IQ2 and IQ2-E, and 10-Gigabit Ethernet interfaces only, enable association of scheduler map names with logical interfaces.



.....

NOTE: Per-unit scheduling is not supported on T1 interfaces configured on the Channelized OC12 IQ PIC.

.....



.....

NOTE: On Gigabit Ethernet IQ2 and IQ2-E PICs without the `per-unit-scheduler` statement, the entire PIC supports 4071 VLANs and the user can configure all the VLANs on the same port.

.....

On Gigabit Ethernet IQ2 and IQ2-E PICs with the `per-unit-scheduler` statement, the entire PIC supports $1024 - 2 * \text{number of ports}$ (1024 minus two times the number of ports), because each port is allocated two default schedulers.

.....

When including the `per-unit-scheduler` statement for interfaces on the IQ2 and IQ2-E PIC, you must also include the `vlan-tagging` statement at the [edit interfaces *interface-name*] hierarchy level.

Required Privilege	interface—To view this statement in the configuration.
Level	interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• vlan-tagging on page 797• Junos OS Class of Service Configuration Guide

performance-monitoring

```
Syntax performance-monitoring {
    delegate-server-processing;
    hardware-assisted-timestamping;
    sla-iterator-profiles {
        profile-name {
            disable;
            calculation-weight {
                delay delay-weight;
                delay-variation delay-variation-weight;
            }
            cycle-time milliseconds;
            iteration-period connections;
            measurement-type (loss | statistical-frame-loss | two-way-delay);
        }
    }
}
```

Hierarchy Level [edit protocols oam ethernet connectivity-fault-management]

Release Information Statement introduced in Junos OS Release 9.5.

Description For Ethernet interfaces on Dense Port Concentrators (DPCs) in MX Series routers only, specify performance monitoring support for Ethernet frame delay measurement.

The remaining statements are explained separately.

Required Privilege Level Configure—To enter configuration mode.
Control—To modify any configuration.

Related Documentation

- Ethernet Frame Delay Measurements Overview
- Guidelines for Configuring Routers to Support an ETH-DM Session
- Enabling the Hardware-Assisted Timestamping Option

periodic

Syntax	<code>periodic interval;</code>
Hierarchy Level	[edit interfaces <i>aex</i> aggregated-ether-options lacp], [edit interfaces interface-range <i>name</i> aggregated-ether-options lacp]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	For aggregated Ethernet interfaces only, configure the interval for periodic transmission of LACP packets.
Options	<i>interval</i> —Interval for periodic transmission of LACP packets. <ul style="list-style-type: none">• fast—Transmit packets every second.• slow—Transmit packets every 30 seconds. Default: fast
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Aggregated Ethernet LACP• Configuring Aggregated Ethernet LACP (CLI Procedure)• Example: Configuring Aggregated Ethernet High-Speed Uplinks Between an EX4200 Virtual Chassis Access Switch and an EX4200 Virtual Chassis Distribution Switch

pfc

Syntax	<code>pfc;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> ppp-options compression], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options compression], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ppp-options compression]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For interfaces with PPP encapsulation, configure the router to compress the protocol field to one byte.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the PPP Protocol Field Compression on page 130

pic-type

Syntax	<code>pic-type (atm1 atm2);</code>
Hierarchy Level	<code>[edit interfaces at-<i>fpc/pic/port</i> atm-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM interfaces, configure the type of ATM PIC installed in your router.
Options	<p><code>atm1</code>—ATM1 PIC.</p> <p><code>atm2</code>—ATM2 IQ PIC.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring the ATM PIC Type

plp-to-clp

Syntax	<code>plp-to-clp;</code>
Hierarchy Level	<p><code>[edit interfaces at-<i>fpc/pic/port</i> atm-options],</code></p> <p><code>[edit interfaces at-<i>fpc/pic/port</i> unit <i>logical-unit-number</i>],</code></p> <p><code>[edit logical-systems <i>logical-system-name</i> interfaces at-<i>fpc/pic/port</i> unit <i>logical-unit-number</i>]</code></p>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, enable the PLP setting to be copied to the cell-loss priority (CLP) bit.
Default	If you omit this statement, the Junos OS does not copy the PLP setting to the CLP bit.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Enabling the PLP Setting to Be Copied to the CLP Bit

plp1

Syntax	<code>plp1 cells;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for QFX Series switches.
Description	For ATM2 IQ interfaces only, define the EPD threshold on a VC. The EPD threshold is a limit on the number of transmit packets that can be queued. Packets that exceed the limit are discarded. This threshold applies to packets that have a PLP of 1.
Default	EPD threshold is unregulated.
Options	cells —Maximum number of cells. Range: For 1-port and 2-port OC12 interfaces, 1 through 425,984 cellsFor 1-port OC48 interfaces, 1 through 425,984 cellsFor 2-port OC3, DS3, and E3 interfaces, 1 through 212,992 cellsFor 4-port DS3 and E3 interfaces, 1 through 106,496 cells
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Two EPD Thresholds per QueueConfiguring an ATM Scheduler Maplinear-red-profile on page 524

point-to-point

Syntax	point-to-point;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For all interfaces except aggregated Ethernet, Fast Ethernet, and Gigabit Ethernet, configure the interface unit as a point-to-point connection. This is the default connection type.
Default	If you omit this statement, the interface unit is configured as a point-to-point connection.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring a Point-to-Point Connection on page 164multipoint on page 581

policer

See the following sections:

- **policer (CFM Firewall)** on page 634
- **policer (CFM Global)** on page 635
- **policer (CFM Session)** on page 636
- **policer (CoS)** on page 637
- **policer (Interface)** on page 638
- **policer (MAC)** on page 639

policer (CFM Firewall)

Syntax `policer cfm-policer {
 if-exceeding {
 bandwidth-limit 8k;
 burst-size-limit 2k;
 }
 then discard;
 }`

Hierarchy Level [edit firewall]

Release Information Statement introduced in Junos OS Release 10.0.

Description Attach an explicit policer to CFM sessions.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

Related Documentation • Configuring Rate Limiting of Ethernet OAM Messages
 • **policer (CFM Global)** on page 635
 • **policer (CFM Session)** on page 636

policer (CFM Global)

Syntax	<pre>policer { all <i>cfm-policer-name</i>; continuity-check <i>cfm-policer-name</i>; other <i>cfm-policer-name</i>; }</pre>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management]
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Specify a policer at the global level to police the CFM traffic belonging to all sessions.
Options	<p>continuity-check <i>cfm-policer-name</i>—Police all continuity check packets with the policer specified.</p> <p>other <i>cfm-policer-name</i>—Police all non-continuity check packets with the policer specified.</p> <p>all <i>cfm-policer-name</i>—Police all CFM packets with policer specified. If the all option is used, then you cannot specify above two options.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Rate Limiting of Ethernet OAM Messagespolicer (CFM Session) on page 636

policer (CFM Session)

Syntax	<pre>policer { all <i>cfm-policer-name</i>; continuity-check <i>cfm-policer-name</i>; other <i>cfm-policer-name</i>; }</pre>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>name</i> level <i>number</i> maintenance-association <i>name</i>]
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Specify a separate policer to rate-limit packets specific to that session.
Options	<ul style="list-style-type: none">• continuity-check <i>cfm-policer-name</i>—Police continuity check packets belonging to this session.• other <i>cfm-policer-name</i>—Police all non-continuity check packets belonging to this session.• all <i>cfm-policer-name</i>—Police all CFM packets belonging to this session. If the all option is used, then you cannot specify the above two options.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Rate Limiting of Ethernet OAM Messages• policer (CFM Global) on page 635


policer (CoS)

Syntax	<pre> policer <i>cos-policer-name</i> { aggregate { bandwidth-limit <i>bps</i>; burst-size-limit <i>bytes</i>; } premium { bandwidth-limit <i>bps</i>; burst-size-limit <i>bytes</i>; } } </pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> <i>gigether-options</i> ethernet-switch-profile ethernet-policer-profile]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Gigabit Ethernet IQ and Gigabit Ethernet PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), define a CoS policer template to specify the premium bandwidth and burst-size limits, and the aggregate bandwidth and burst-size limits. For Gigabit Ethernet interfaces with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), the premium policer is not supported.
Options	<p><i>cos-policer-name</i>—Name of one policer to specify the premium bandwidth and burst-size limits, and the aggregate bandwidth and burst-size limits.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Gigabit Ethernet Policers

policer (Interface)

Syntax	<pre>policer { arp <i>policer-template-name</i>; input <i>policer-template-name</i>; output <i>policer-template-name</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Apply a policer to an interface.
Options	<p>arp <i>policer-template-name</i>—For <i>inet</i> family only, name of one policer to evaluate when ARP packets are received on the interface.</p> <p>input <i>policer-template-name</i>—Name of one policer to evaluate when packets are received on the interface.</p> <p>output <i>policer-template-name</i>—Name of one policer to evaluate when packets are transmitted on the interface.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Applying Policers on page 199• Junos OS Routing Policy Configuration Guide• Junos OS Services Interfaces Configuration Guide

policer (MAC)

Syntax	<pre> policer { input <i>cos-policer-name</i>; output <i>cos-policer-name</i>; } </pre>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> accept-source-mac <i>mac-address mac-address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> accept-source-mac <i>mac-address mac-address</i>]</p>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Gigabit Ethernet IQ and Gigabit Ethernet PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), configure MAC policing.
<div>  <p>NOTE:</p> <p>On MX Series routers with Gigabit Ethernet or Fast Ethernet PICs, the following considerations apply:</p> <ul style="list-style-type: none"> • Interface counters do not count the 7-byte preamble and 1-byte frame delimiter in Ethernet frames. • In MAC statistics, the frame size includes MAC header and CRC before any VLAN rewrite/imposition rules are applied. • In traffic statistics, the frame size encompasses the L2 header without CRC after any VLAN rewrite/imposition rule. </div>	
Options	<p>input <i>cos-policer-name</i>—Name of one policer to specify the premium bandwidth and aggregate bandwidth.</p> <p>output <i>cos-policer-name</i>—Name of one policer to specify the premium bandwidth and aggregate bandwidth.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring MAC Address Filtering

pool

Syntax	<code>pool <i>pool-name</i> <priority <i>priority</i>>;</code>
Hierarchy Level	[edit interfaces <i>br-pim</i> / <i>0</i> / <i>port</i> dialer-options], [edit interfaces <i>umd</i> <i>0</i> dialer-options], [edit interfaces <i>dl</i> <i>n</i> unit <i>logical-unit-number</i> dialer-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>dl</i> <i>n</i> unit <i>logical-unit-number</i> dialer-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	On J Series Services Routers, for logical and physical ISDN interfaces, specify the dial pool. The dial pool allows logical (dialer) and physical (<i>br-pim/0/port</i>) interfaces to be bound together dynamically on a per-call basis. On a dialer interface, pool directs the dialer interface which dial pool to use. On <i>br-pim/0/port</i> interface, pool defines the pool to which the interface belongs.
Options	<i>pool-name</i> —Pool identifier. <i>priority priority</i> —(Physical <i>br-pim/0/port</i> interfaces only) Specify a priority value of 0 (lowest) to 255 (highest) for the interface within the pool.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring ISDN Physical Interface Properties• Specifying a USB Modem Interface on J Series Routers on page 102• <i>Junos OS Interfaces and Routing Configuration Guide</i>

pop

Syntax	pop;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Gigabit Ethernet IQ and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and aggregated Ethernet interfaces using Gigabit Ethernet IQ interfaces, specify the VLAN rewrite operation to remove a VLAN tag from the top of the VLAN tag stack. The outer VLAN tag of the frame is removed.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Removing a VLAN Tag

pop-all-labels

Syntax	<pre>pop-all-labels { required-depth <i>number</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options mpls], [edit interfaces <i>interface-name</i> sonet-options mpls], [edit interfaces <i>interface-name</i> fastether-options mpls], [edit interfaces <i>interface-name</i> gigether-options mpls]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For passive monitoring on ATM and SONET/SDH interfaces only, removes up to two MPLS labels from incoming IP packets.</p> <p>This statement has no effect on IP packets with more than two MPLS labels. Packets with MPLS labels cannot be processed by the Monitoring Services PIC; if packets with MPLS labels are forwarded to the Monitoring Services PIC, they are discarded.</p> <p>The remaining statement is explained separately.</p>
Default	If you omit this statement, the MPLS labels are not removed, and the packet is not processed by the Monitoring Services PIC.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Removing MPLS Labels from Incoming Packets• Removing MPLS Labels from Incoming Packet• Junos OS Services Interfaces Configuration Guide

pop-pop

Syntax	pop-pop;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map]
Release Information	Statement introduced in Junos OS Release 8.1.
Description	For Gigabit Ethernet IQ, IQ2 and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and for aggregated Ethernet interfaces using Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet PICs on MX Series routers, specify the VLAN rewrite operation to remove both the outer and inner VLAN tags of the frame.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Removing the Outer and Inner VLAN Tags

pop-swap

Syntax	pop-swap;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map]
Release Information	Statement introduced in Junos OS Release 8.1.
Description	For Gigabit Ethernet IQ, IQ2, and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and for aggregated Ethernet interfaces using Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet PICs on MX Series routers, specify the VLAN rewrite operation to remove the outer VLAN tag of the frame, and replace the inner VLAN tag of the frame with a user-specified VLAN tag value. The inner tag becomes the outer tag in the final frame.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Removing the Outer VLAN Tag and Rewriting the Inner VLAN Tag

port

Syntax	<pre>port { minimum <i>port-number</i>; maximum <i>port-number</i>; }</pre>
Hierarchy Level	[edit interfaces <i>vsp-fpc/pic/port</i> unit <i>logical-unit-number</i> compression rtp]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For voice services interfaces only, assign User Datagram Protocol (UDP) destination port numbers reserved for Real-Time Transport Protocol (RTP) traffic.
Options	<p>minimum <i>port-number</i>—Specify minimum port number. Range: 0 through 65,535</p> <p>maximum <i>port-number</i>—Specify maximum port number. Range: 0 through 65,535</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

port-priority

Syntax	<pre>port-priority <i>priority</i>;</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> gigether-options 802.3ad lacp]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Define LACP port priority at the interface level.
Options	<p><i>priority</i>—Priority for being elected to be the active port and both collect and distribute traffic. A smaller value indicates a higher priority for being elected. Range: 1 through 255 Default: 127</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

port-status-tlv

Syntax	<code>port-status-tlv blocked;</code>
Hierarchy Level	<code>[edit protocols oam ethernet connectivity-fault-management action-profile tlv-action event]</code>
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Define an action-profile consisting of various events and the action. Based on values of port-status-tlv in the received CCM packets, specific action such as <i>interface-down</i> can be taken using action-profile options.
Options	blocked —When the incoming CCM packet contains port status TLV with value blocked, the action will be triggered for this action-profile.
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring a Connectivity Fault Management Action Profile Configuring Remote MEP Action Profile Support

post-service-filter

Syntax	<code>post-service-filter <i>filter-name</i>;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet service input]</code> , <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet service input]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Define the filter to be applied to traffic after service processing. The filter is applied only if a service set is configured and selected.
Options	<i>filter-name</i> —Identifier for postservice filter.
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Junos OS Services Interfaces Configuration Guide

ppp-options

Syntax	<pre>ppp-options { chap { access-profile name; default-chap-secret name; local-name name; passive; } compression { acfc; pfc; } dynamic-profile profile-name; lcp-max-conf-req number lcp-restart-timer milliseconds; loopback-clear-timer seconds; ncp-max-conf-req number ncp-restart-timer milliseconds; pap { access-profile name; default-pap-password password; local-name name; local-password password; passive; } }</pre>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>lcp-restart-timer statement introduced in Junos OS Release 8.1.</p> <p>ncp-restart-timer statement introduced in Junos OS Release 8.1.</p> <p>loopback-clear-timer statement introduced in Junos OS Release 8.5.</p> <p>dynamic-profile statement introduced in Junos OS Release 9.5.</p>
Description	<p>On interfaces with PPP encapsulation, configure PPP-specific interface properties.</p> <p>For ATM2 IQ interfaces only, you can configure CHAP on the logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:</p> <ul style="list-style-type: none">• atm-ppp-llc—PPP over AAL5 LLC encapsulation.• atm-ppp-vc-mux—PPP over AAL5 multiplex encapsulation. <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>

- Related Documentation**
- Configuring the PPP Challenge Handshake Authentication Protocol on page 121

pppoe-options

Syntax	<pre>pppoe-options { access-concentrator <i>name</i>; auto-reconnect <i>seconds</i>; (client server); service-name <i>name</i>; underlying-interface <i>interface-name</i>; }</pre>
Hierarchy Level	<pre>[edit interfaces pp0 unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces pp0 unit <i>logical-unit-number</i>]</pre>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>client Statement introduced in Junos OS Release 8.5.</p> <p>server Statement introduced in Junos OS Release 8.5.</p>
Description	<p>For J Series Services Routers, M120 Multiservice Edge Routers, M320 Multiservice Edge Service Routers, and MX Series Universal Edge Routers with PPP over Ethernet interfaces, configure PPP over Ethernet-specific interface properties.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring a PPPoE Interface

pppoe-underlying-options (Static and Dynamic Subscribers)

Syntax	<pre>pppoe-underlying-options { access-concentrator <i>name</i>; dynamic-profile <i>profile-name</i>; duplicate-protection; max-sessions <i>number</i>; service-name-table <i>table-name</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 10.0.
Description	<p>Configure PPPoE-specific interface properties for the underlying interface on which the router creates a static or dynamic PPPoE logical interface. The underlying interface must be configured with PPPoE (ppp-over-ether) encapsulation.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring PPPoE (for static interfaces)• Configuring an Underlying Interface for Dynamic PPPoE Subscriber Interfaces• Assigning a Service Name Table to a PPPoE Underlying Interface

preferred

Syntax	preferred;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	Configure this address to be the preferred address on the interface. If you configure more than one address on the same subnet, the preferred source address is chosen by default as the source address when you initiate frame transfers to destinations on the subnet.
Default	The lowest-numbered address on the subnet is the preferred address.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the Interface Address on page 182

preferred-source-address

Syntax	<code>preferred-source-address address;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> unnumbered-address <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> unnumbered-address <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 9.0.
Description	<p>For unnumbered Ethernet interfaces configured with a loopback interface as the donor interface, specify one of the loopback interface's secondary addresses as the preferred source address for the unnumbered Ethernet interface. Configuring the preferred source address enables you to use an IP address other than the primary IP address on some of the unnumbered Ethernet interfaces in your network.</p> <p>Configuration of a preferred source address for unnumbered Ethernet interfaces is supported for the IPv4 and IPv6 address families.</p>
Options	address —Secondary IP address of the donor loopback interface.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring a Preferred Source Address for Unnumbered Ethernet or Demux Interfaces on page 192address on page 306Junos OS System Basics Configuration Guide

premium

See the following sections:

- **premium (Hierarchical Policer)** on page 651
- **premium (Output Priority Map)** on page 652
- **premium (Policer)** on page 652

premium (Hierarchical Policer)

Syntax

```
premium {
  if-exceeding {
    bandwidth-limit bandwidth;
    burst-size-limit burst;
  }
  then {
    discard;
  }
}
```

Hierarchy Level [edit firewall hierarchical-policer]

Release Information Statement introduced in Junos OS Release 9.5.

Description For M40e, M120, and M320 (with FFPC and SFPC) edge routers and T320, T640, and T1600 core routers with Enhanced Intelligent Queuing (IQE) PICs, specify a premium level for a hierarchical policer.

Options Options are described separately.

Required Privilege Level firewall—To view this statement in the configuration.
firewall-control—To add this statement to the configuration.

Related Documentation

- Applying Policers on page 199
- [Junos OS Class of Service Configuration Guide](#)

premium (Output Priority Map)

Syntax	<pre>premium { forwarding-class <i>class-name</i> { loss-priority (high low); } }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile ethernet-policer-profile output-priority-map classifier]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Gigabit Ethernet IQ interfaces only, define the classifier for egress premium traffic. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Specifying an Output Priority Map• input-priority-map on page 491

premium (Policer)

Syntax	<pre>premium { bandwidth-limit <i>bps</i>; burst-size-limit <i>bytes</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> gigether-options ethernet-switch-profile ethernet-policer-profile policer <i>cos-policer-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Define a policer to apply to nonpremium traffic. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Gigabit Ethernet Policers• aggregate (Gigabit Ethernet CoS Policer) on page 311• ieee802.1p on page 474

preserve-interface

Syntax	preserve-interface;
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced in Junos OS Release 7.6.
Description	<p>Provide link PIC replication, providing MLPPP link redundancy at the port level. This feature is supported with SONET APS and the following link PICs:</p> <ul style="list-style-type: none">• Channelized OC3 IQ PIC• Channelized OC12 IQ PIC• Channelized STM1 IQ PIC <p>Link PIC replication provides the ability to add two sets of links, one from the active SONET PIC and the other from the standby SONET PIC, to the same bundle. If the active SONET PIC fails, links from the standby PIC are used without triggering link renegotiation. All the negotiated state is replicated from the active links to the standby links to prevent link renegotiation.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring Link PIC Redundancy• Junos OS Services Interfaces Configuration Guide

primary

See the following sections:

- **primary (Address on Interface)** on page 654
- **primary (AS PIC or Multiservices PIC Interfaces)** on page 654

primary (Address on Interface)

Syntax	<code>primary;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	Configure this address to be the primary address of the protocol on the interface. If the logical unit has more than one address, the primary address is used by default as the source address when packet transfer originates from the interface and the destination address does not indicate the subnet.
Default	For unicast traffic, the primary address is the lowest non-127 preferred address on the unit.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Interface Address on page 182

primary (AS PIC or Multiservices PIC Interfaces)

Syntax	<code>primary <i>interface-name</i>;</code>
Hierarchy Level	[edit interfaces (rsp0 rsp1) redundancy-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the primary AS PIC or MultiServices PIC interface.
Options	<i>interface-name</i> —The identifier for the AS PIC interface or MultiServices PIC interface, which must be of the form sp-fpc/pic/port .
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

priority

See the following sections:

- **priority (OAM Connectivity-Fault Management)** on page 655
- **priority (Schedulers)** on page 656



NOTE: For information about the priority statement at the [edit interfaces *interface-name* unit *unit-number* family inet address *address* (vrrp-group | vrrp-inet6-group) *group-number*] or [edit logical-systems *logical-system-name* interfaces *interface-name* unit *unit-number* family (inet | inet6) address *address* (vrrp-group | vrrp-inet6-group) *group-number*] hierarchy level, see the [Junos OS High Availability Configuration Guide](#).

priority (OAM Connectivity-Fault Management)

Syntax	<code>priority <i>number</i>;</code>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>md-name</i> maintenance-association <i>ma-name</i> mep <i>mep-id</i>]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	IEEE 802.1p priority bits used by the continuity check messages.
Options	<p><i>number</i>—Configure the IEEE 802.1p priority bits to be used in the VLAN header of the CFM packets.</p> <p>Range: 0 through 7</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring a Maintenance Endpoint

priority (Schedulers)

Syntax	<code>priority (high low);</code>
Hierarchy Level	[edit interfaces <i>at-fpc/pic/port</i> atm-options scheduler-maps <i>map-name</i> forwarding-class <i>class-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, assign queuing priority to a forwarding class.
Options	low —Forwarding class has low priority. high —Forwarding class has high priority.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ATM2 IQ VC Tunnel CoS Components

priority

Syntax	<code>priority <i>priority-value</i>;</code>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>md-name</i> maintenance-association <i>ma-name</i> mep <i>mep-id</i> remote-mep <i>remote-mep-id</i> sla-iterator-profile <i>profile-name</i>]
Release Information	Statement introduced in Junos OS Release 11.1.
Description	Configure the priority of the iterator profile, which is the vlan-pcp value that is sent in the Y.1731 data frames.
Options	<i>priority-value</i> —Priority value, which is the vlan-pcp value that is sent in the Y.1731 data frames. Range: 0 through 7 Default: 0
Required Privilege Level	Configure—To enter configuration mode. Control—To modify any configuration.
Related Documentation	<ul style="list-style-type: none">sla-iterator-profile on page 706Configuring a Remote MEP with an Iterator Profile

promiscuous-mode

Syntax	<code>promiscuous-mode { vpi <i>vpi-identifier</i>; }</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM interfaces with atm-ccc-cell-relay encapsulation, map all incoming cells from either an interface port or a VP to a single label-switched path (LSP) without restricting the VCI number. Promiscuous mode allows you to map traffic from all 65,535 VCIs to a single LSP, or from all 256 VPIs to a single LSP.
Options	vpi-identifier —Open this VPI in promiscuous mode. Range: 0 through 255
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring ATM Cell-Relay Promiscuous Mode vpi (ATM CCC Cell-Relay Promiscuous Mode) on page 803

protect-circuit

Syntax	<code>protect-circuit <i>group-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the protect router in an APS circuit pair. When the working interface fails, APS brings up the protection circuit and the traffic is moved to the protection circuit.
Options	group-name —Circuit's group name.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Basic APS Support working-circuit on page 811

protection-group

Syntax

```
protection-group {  
  ethernet-ring ring-name (  
    node-id mac-address;  
    ring-protection-link-owner;  
    east-interface {  
      control-channel channel-name {  
        ring-protection-link-end;  
      }  
    }  
    west-interface {  
      node-id mac-address;  
      control-channel channel-name {  
        ring-protection-link-end;  
      }  
    }  
    data-channel {  
      vlan number;  
    }  
    guard-interval number;  
    restore-interval number;  
  }  
}
```

Hierarchy Level [edit protocols]

Release Information Statement introduced in Junos OS Release 9.4.

Description Configure Ethernet ring protection switching.

The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Ethernet Ring Protection Switching Overview
- Ethernet Ring Protection Using Ring Instances for Load Balancing
- Example: Configuring Load Balancing Within Ethernet Ring Protection for MX Series Routers

protocol-down

Syntax	<code>protocol-down;</code>
Hierarchy Level	<code>[edit protocols oam ethernet link-fault-management action-profile event]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Upper layer indication of protocol down event. When the protocol-down statement is included, the protocol down event triggers the action specified under the action statement.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring an OAM Action Profile

protocols

Syntax	<code>protocols [inet iso mpls];</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> unit logical-unit-number family tcc]</code>
Release Information	Statement introduced in Junos OS Release 8.3.
Description	For Layer 2.5 VPNs on T Series, MX Series, M120, and M320 routers support, configure IS-IS (ISO traffic) or MPLS traffic to traverse a TCC interface. By default, IPv4 (inet) traffic runs on T Series, MX, Series, M120, and M320 routers and over TCC interfaces. You must configure the same traffic type on both ends of the Layer 2.5 VPN.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring IS-IS or MPLS Traffic for TCC Interfaces on page 235

proxy

Syntax	<code>proxy inet-address <i>address</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family tcc], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family tcc]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Layer 2.5 VPNs using an Ethernet interface as the TCC router, configure the IP address for which the TCC router is proxying. Ethernet TCC is supported on interfaces that carry IPv4 traffic only. Ethernet TCC encapsulation is supported on 1-port Gigabit Ethernet, 2-port Gigabit Ethernet, 4-port Gigabit Ethernet, and 4-port Fast Ethernet PICs only. Ethernet TCC is not supported on the T640 router.
Options	inet-address —Configure the IP address of the neighbor to the TCC router.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Ethernet TCC• Example: Configuring an Ethernet TCC or Extended VLAN TCC• remote on page 674• Junos OS VPNs Configuration Guide

proxy-arp

Syntax	<code>proxy-arp (restricted unrestricted);</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.6 for EX Series switches. restricted added in Junos OS Release 10.0 for EX Series switches.
Description	For Ethernet interfaces only, configure the router or switch to respond to any ARP request, as long as the router or switch has an active route to the ARP request's target address.
Default	Proxy ARP is not enabled. The router or switch responds to an ARP request only if the destination IP address is its own.
Options	<ul style="list-style-type: none"> • none—The switch responds to any ARP request for a local or remote address if the switch has a route to the target IP address. • restricted—(Optional) The switch responds to ARP requests in which the physical networks of the source and target are different and does not respond if the source and target IP addresses are in the same subnet. The switch must also have a route to the target IP address. • unrestricted—(Optional) The switch responds to any ARP request for a local or remote address if the switch has a route to the target IP address. <p>Default: unrestricted</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Unrestricted Proxy ARP • Configuring Proxy ARP (CLI Procedure) • Example: Configuring Proxy ARP on an EX Series Switch • Configuring Gratuitous ARP

push

Syntax	push;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Gigabit Ethernet IQ and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and aggregated Ethernet interfaces using Gigabit Ethernet IQ interfaces, specify the VLAN rewrite operation to add a new VLAN tag to the top of the VLAN stack. An outer VLAN tag is pushed in front of the existing VLAN tag. If you include the push statement in the configuration, you must also include the pop statement at the [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map] hierarchy level.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Stacking a VLAN Tag

push-push

Syntax	push-push;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map]
Release Information	Statement introduced in Junos OS Release 8.1.
Description	For Gigabit Ethernet IQ, IQ2 and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and for aggregated Ethernet interfaces using Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet PICs on MX Series routers, specify the VLAN rewrite operation to push two VLAN tags in front of the frame.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Stacking Two VLAN Tags

queue-depth

Syntax	<code>queue-depth <i>cells</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options linear-red-profiles <i>profile-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define maximum queue depth in the CoS VC drop profile. Packets are always dropped beyond the defined maximum. This statement is mandatory; there is no default configuration.
Default	Buffer usage is unregulated.
Options	<i>cells</i> —Maximum number of cells the queue can contain. Range: 1 through 64,000 cells
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring ATM2 IQ VC Tunnel CoS Components• high-plp-threshold on page 467• low-plp-threshold on page 554

queue-length

Syntax	<code>queue-length <i>number</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> shaping], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> shaping]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	For ATM1 interfaces only, define the maximum queue length in the traffic-shaping profile. For ATM1 PICs, each VC has its own independent shaping parameters.
Default	Buffer usage is unregulated.
Options	<i>number</i> —Maximum number of packets the queue can contain. Range: 1 through 16,383 packets Default: 16,383 packets
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the ATM1 Queue Length

queues

Syntax	<code>queues [<i>queue-numbers</i>];</code>
Hierarchy Level	[edit interfaces <i>vsp-fpc/pic/port</i> unit <i>logical-unit-number</i> compression rtp]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For voice services interfaces only, assign queue numbers for RTP traffic.
Options	<code>queues <i>queue-numbers</i></code> —Assign one or more of the following queues: q0 , q1 , q2 , q3 . For VRRP services, specify the q3 option instead of q0 .
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Junos OS Services Interfaces Configuration Guide

quiet-period

Syntax	<code>quiet-period seconds;</code>
Hierarchy Level	<code>[edit protocols dot1x authenticator interface <i>interface-id</i>]</code>
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Specify the number of seconds the port remains in the wait state following a failed authentication exchange with the client, before reattempting authentication.
Options	<p>seconds—Specify the number of seconds the port remains in the wait state following a failed authentication exchange with the client, before reattempting authentication.</p> <p>Range: 0 through 65,535 seconds</p> <p>Default: 60 seconds</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IEEE 802.1x Port-Based Network Access Control Overview • authenticator on page 326 • dot1x on page 405 • interface (IEEE 802.1x) on page 495

radius-realm

Syntax	<code>radius-realm radius-realm-string;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> auto-configure vlan-ranges authentication username-include], [edit interfaces <i>interface-name</i> auto-configure stacked-vlan-ranges authentication username-include]</code>
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Specify that the user-defined RADIUS realm string is appended as a last piece to the username and used by RADIUS to direct the authentication request to a profile that does not allocates addresses.
Options	radius-realm-string —A string to describe the RADIUS realm.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring VLAN Interface Username Information for AAA Authentication

ranges

See the following sections:

- **ranges (Dynamic Stacked VLAN)** on page 666
- **ranges (Dynamic VLAN)** on page 667

ranges (Dynamic Stacked VLAN)

Syntax	<code>ranges (any <i>low-tag-high-tag</i>),(any <i>low-tag-high-tag</i>);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> auto-configure stacked-vlan-ranges dynamic-profile <i>profile-name</i>]
Release Information	Statement introduced in Junos OS Release 9.5.
Description	Configure VLAN ranges for dynamic, auto-sensed stacked VLANs.
Options	<p>any—The entire VLAN range.</p> <p><i>low-tag</i>—The lower limit of the VLAN range.</p> <p><i>high-tag</i>—The upper limit of the VLAN range.</p> <p>Range: 1 through 4094</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring Stacked VLAN Ranges for Use with Stacked VLAN Dynamic Profiles

ranges (Dynamic VLAN)

Syntax	<code>ranges (any <i>low-tag</i>)-(any <i>high-tag</i>);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> auto-configure vlan-ranges dynamic-profile <i>profile-name</i>]
Release Information	Statement introduced in Junos OS Release 9.5.
Description	Configure VLAN ranges for dynamic, auto-sensed VLANs.
Options	<p>any—The entire VLAN range.</p> <p><i>low-tag</i>—The lower limit of the VLAN range.</p> <p><i>high-tag</i>—The upper limit of the VLAN range.</p> <p>Range: 1 through 4094</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Single-Level VLAN Ranges for Use with VLAN Dynamic Profiles

rate

Syntax	<code>rate <i>percentage</i>;</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> receive-bucket],</p> <p>[edit interfaces <i>interface-name</i> transmit-bucket]</p>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify percentage of the interface line rate that is available to receive or transmit packets.
Options	<p><i>percentage</i>—Percentage of the interface line rate that is available to receive or transmit packets.</p> <p>Range: 0 through 100</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Receive and Transmit Leaky Bucket Properties on page 138 Configuring Receive and Transmit Leaky Bucket Properties on SONET/SDH Interfaces

rate

Syntax	<code>rate new-sessions-per-second;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> services-options session-limit]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Specify the maximum number of new sessions allowed per second.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

reassemble-packets

Syntax	<code>reassemble-packets;</code>
Hierarchy Level	[edit interfaces <i>gr-fpc/pic/port</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>gr-fpc/pic/port</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 9.2.
Description	Enable reassembly of fragmented tunnel packets on generic routing encapsulation (GRE) tunnel interfaces.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

reauthentication

Syntax	reauthentication (disable interval <i>seconds</i>);
Hierarchy Level	[edit protocols dot1x authenticator interface <i>interface-id</i>]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Set or disable the periodic reauthentication of the client.
Options	<ul style="list-style-type: none"> • disable—Disable the periodic reauthentication of the client. • interval <i>seconds</i>—Specify the periodic reauthentication time interval. <p>Range: 1 through 65,535 seconds Default: 3600 seconds</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • IEEE 802.1x Port-Based Network Access Control Overview • dot1x on page 405 • interface (IEEE 802.1x) on page 495 • quiet-period on page 665

rebalance-periodic (Aggregated Ethernet Subscriber Interfaces)

Syntax	rebalance-periodic time <i>hour:minute</i> <interval <i>hours</i> >
Hierarchy Level	[edit interfaces ae <i>number</i> aggregated-ether-options]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	Configure periodic rebalancing of distribution of subscribers on an aggregated Ethernet bundle.
Options	<p><i>hour:minute</i>—Time at which the rebalancing occurs, in military time.</p> <p><i>hours</i>—Interval at which the rebalancing occurs, in hours. Default: 24 hours.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Periodic Rebalancing of Subscribers in an Aggregated Ethernet Interface

receive-bucket

Syntax	<pre>receive-bucket { overflow (discard tag); rate <i>percentage</i>; threshold <i>bytes</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Set parameters for the receive leaky bucket, which specifies what percentage of the interface's total capacity can be used to receive packets.</p> <p>For each DS3 channel on a channelized OC12 interface, you can configure a unique receive bucket.</p> <p>The statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Receive and Transmit Leaky Bucket Properties on SONET/SDH Interfacestransmit-bucket on page 760

receive-options-packets

Syntax	<pre>receive-options-packets;</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For a Monitoring Services PIC and an ATM or SONET/SDH PIC installed in an M160, M40e, or T Series router, guarantee conformity with cflowd records structure. This statement is required when you enable passive monitoring.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Enabling Passive Monitoring on ATM InterfacesEnabling Passive Monitoring on SONET/SDH Interfaces

receive-ttl-exceeded

Syntax	receive-ttl-exceeded;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Monitoring Services PIC and an ATM or SONET/SDH PIC installed in an M160, M40e, or T Series router, guarantee conformity with cflowd records structure. This statement is required when you enable passive monitoring.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Enabling Passive Monitoring on ATM Interfaces Enabling Passive Monitoring on SONET/SDH Interfaces

red-differential-delay

Syntax	red-differential-delay <i>milliseconds</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For link services and voice services interfaces only, configure the red differential delay among bundle links to give warning when a link has a differential delay that exceeds the configured threshold.
Options	<i>milliseconds</i> —Red differential delay threshold. Range: 1 through 2000 milliseconds Default: 10 milliseconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> action-red-differential-delay on page 304 yellow-differential-delay on page 811 Junos OS Services Interfaces Configuration Guide

redial-delay

Syntax	<code>redial-delay <i>time</i>;</code>
Hierarchy Level	[edit interfaces <i>dl</i> n unit <i>logical-unit-number</i> dialer-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>dl</i> n unit <i>logical-unit-number</i> dialer-options]
Release Information	Statement introduced in Junos OS Release 7.5.
Description	<p>On J Series Services Routers with interfaces configured for ISDN with dialout, specify the delay (in seconds) between two successive calls made by the dialer. To configure callback mode, include the callback statement at the [edit interfaces <i>dl</i>n unit <i>logical-unit-number</i> dialer-options] hierarchy level.</p> <p>If the callback statement is configured, you cannot use the caller <i>caller-id</i> statement at the [edit interfaces <i>dl</i>n unit <i>logical-unit-number</i> dialer-options] hierarchy level.</p>
Options	<p>time—Delay (in seconds) between two successive calls.</p> <p>Range: 2 through 255 seconds</p> <p>Default: 3 seconds</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• ISDN Interfaces Overview• <i>Junos OS Interfaces and Routing Configuration Guide</i>

redundancy-options

Syntax	<pre>redundancy-options { primary <i>interface-name</i>; secondary <i>interface-name</i>; hot-standby; }</pre>
Hierarchy Level	[edit interfaces (rsp0 rsp1)], [edit interfaces rlsqnumber]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the primary and secondary (backup) AS PIC interfaces or MultiServices PIC interfaces.
Options	<p><i>primary interface-name</i>—The identifier for the primary LSQ AS or MultiServices PIC interface.</p> <p><i>secondary interface-name</i>—The identifier for the secondary (backup) LSQ AS or MultiServices PIC interface.</p> <p><i>hot-standby</i>—For one-to-one AS or MultiServices PIC redundancy configurations, specify that the failure detection and recovery must take place in less than 5 seconds.</p>
Required Privilege Level	<p><i>interface</i>—To view this statement in the configuration.</p> <p><i>interface-control</i>—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

remote

Syntax	<pre>remote { (inet-address <i>address</i> mac-address <i>address</i>); }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family tcc], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family tcc]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Layer 2.5 VPNs using an Ethernet interface as the TCC router, configure the location of the remote router. Ethernet TCC is supported on interfaces that carry IPv4 traffic only. Ethernet TCC encapsulation is supported on 1-port Gigabit Ethernet, 2-port Gigabit Ethernet, 4-port Gigabit Ethernet, and 4-port Fast Ethernet PICs only.
Options	mac-address —Configure the MAC address of the remote site. inet-address —Configure the IP address of the remote site.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Ethernet TCC• Example: Configuring an Ethernet TCC or Extended VLAN TCC• proxy on page 660• Junos OS VPNs Configuration Guide

remote-loopback

Syntax	<pre>remote-loopback;</pre>
Hierarchy Level	[edit protocols oam link-fault-management interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	For Ethernet interfaces on M320, M120, MX Series, and T Series routers, set the remote DTE into loopback mode. Remove the statement from the configuration to take the remote DTE out of loopback mode. Used for IEEE 802.3ah Operation, Administration, and Management (OAM) support.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Setting a Remote Interface into Loopback Mode

remote-loopback-respond

Syntax	remote-loopback-respond;
Hierarchy Level	[edit interfaces <i>ct1-fpc/pic/port</i>], [edit interfaces <i>interface-name</i> t1-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For T1 interfaces only, configure the router to respond to remote loopback requests. Remote loopback requests can be from the facilities data link or inband.



NOTE: When configuring CT1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the `remote-loopback-respond` statement must be included at the [edit interfaces *ct1-fpc/pic/port*] hierarchy level.

Default	The router does not respond to remote loop requests.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring the T1 Remote Loopback Response feac-loop-respond on page 447 loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) on page 549

remote-mep

Syntax	<pre>remote-mep mep-id { action-profile profile-name; sla-iterator-profile profile-name { data-tlv-size size; iteration-count count-value; priority priority-value; } }</pre>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>md-name</i> maintenance-association <i>ma-name</i> mep <i>mep-id</i>]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	Configure the numeric identifier of the remote maintenance association end point (MEP) within the maintenance association.
Options	<p>mep-id—Numeric identifier of the MEP.</p> <p>Range: 1 through 8191</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	Configure—To enter configuration mode. Control—To modify any configuration.
Related Documentation	<ul style="list-style-type: none">Configuring a Maintenance Endpoint

request

Syntax	<pre>request (protect working);</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Perform a manual switch between the protect and working circuits. This statement is honored only if there are no higher-priority reasons to switch.
Options	<p>protect—Request that the circuit become the protect circuit.</p> <p>working—Request that the circuit become the working circuit.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Switching Between the Working and Protect Circuitsforce on page 450

required-depth

Syntax	<code>required-depth <i>number</i>;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> atm-options mpls pop-all-labels],</code> <code>[edit interfaces <i>interface-name</i> sonet-options mpls pop-all-labels],</code> <code>[edit interfaces <i>interface-name</i> fastether-options mpls pop-all-labels],</code> <code>[edit interfaces <i>interface-name</i> gigether-options mpls pop-all-labels]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For passive monitoring on ATM and SONET/SDH interfaces only, specify the number of MPLS labels an incoming packet must have for the pop-all-labels statement to take effect.</p> <p>If you include the required-depth 1 statement, the pop-all-labels statement takes effect for incoming packets with one label only. If you include the required-depth 2 statement, the pop-all-labels statement takes effect for incoming packets with two labels only.</p>
Options	<p><i>number</i>—Number of MPLS labels on incoming IP packets.</p> <p>Range: 1 or 2 labels</p> <p>Default: If you omit this statement, the pop-all-labels statement takes effect for incoming packets with one or two labels. The default is equivalent to including the required-depth [1 2] statement.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Removing MPLS Labels from Incoming Packets Removing MPLS Labels from Incoming Packets Junos OS Services Interfaces Configuration Guide

restore-interval

Syntax	<code>restore-interval <i>number</i>;</code>
Hierarchy Level	[edit protocols protection-group ethernet-ring <i>ring-name</i>]
Release Information	Statement introduced in Junos OS Release 9.4.
Description	Specify the wait time to restore the interval, in minutes.
Options	<i>number</i> —Specify the restore interval. Range: 5 through 12 minutes
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Ethernet Ring Protection Switching Overview


retries

Syntax	<code>retries <i>integer</i>;</code>
Hierarchy Level	[edit protocols dot1x authenticator interface <i>interface-id</i>]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Set a limit on the number of failed authentication attempts between a port and a client. When the limit is exceeded, the port waits to reattempt authentication for the number of seconds set by the quiet-period statement configured at the same hierarchy level.
Options	<i>integer</i> —Specify the number of retries. Range: 1 through 10 Default: 3 retries
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IEEE 802.1x Port-Based Network Access Control Overview• dot1x on page 405• interface (IEEE 802.1x) on page 495• quiet-period on page 665

revert-time

Syntax	<code>revert-time seconds;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure APS revertive mode.
Default	APS operates in nonrevertive mode.
Options	<p>seconds—Amount of time to wait after the working circuit has again become functional before making the working circuit active again.</p> <p>Range: 1 through 65,535 seconds</p> <p>Default: None (APS operates in nonrevertive mode)</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Revertive Mode

revertive

Syntax	<code>revertive;</code>
Hierarchy Level	[edit interfaces aeX aggregated-ether-options lacp link-protection]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Enable the ability to switch to a better priority link (if one is available).
	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;">  </div> <div> <p>NOTE: By default, LACP link protection is revertive. However, you can use this statement to define a specific aggregated Ethernet interface as revertive to override a global non-revertive statement specified at the [edit chassis] hierarchy level.</p> </div> </div>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> non-revertive

rfc-2615

Syntax	rfc-2615;
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Include this statement to enable features described in RFC 2615, <i>PPP over SONET/SDH</i> .
Default	Settings required by RFC 1619, <i>PPP over SONET/SDH</i> .
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring SONET/SDH RFC 2615 Support

ring-protection-link-end

Syntax	ring-protection-link-end;
Hierarchy Level	[edit protocols protection-group ethernet-ring <i>ring-name</i> (east-interface west-interface)]
Release Information	Statement introduced in Junos OS Release 9.4.
Description	For MS Series routers, specify that the port is one side of a ring protection link (RPL) by setting the RPL end flag.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Ethernet Ring Protection Switching Overview

ring-protection-link-owner

Syntax	ring-protection-link-owner;
Hierarchy Level	[edit protocols protection-group ethernet-ring <i>ring-name</i>]
Release Information	Statement introduced in Junos OS Release 9.4.
Description	For MS Series routers, specify the ring protection link (RPL) owner flag in the Ethernet protection ring. Include this statement only once for each ring (only one node can function as the RPL owner).
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Ethernet Ring Protection Switching Overview

routing-instance

Syntax	<pre>routing-instance { destination <i>routing-instance-name</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	To configure interfaces and logical-systems , specify the destination routing instance that points to the routing table containing the tunnel destination address.
Default	The default Internet routing table is inet.0 .
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Junos OS Services Interfaces Configuration Guide

routing-instance (PPPoE Service Name Tables)

Syntax	<code>routing-instance <i>routing-instance-name</i>;</code>
Hierarchy Level	<code>[edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i>],</code> <code>[edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i> agent-specifier</code> <code>aci <i>circuit-id-string</i> ari <i>remote-id-string</i>]</code>
Release Information	Statement introduced in Junos OS Release 10.2.
Description	<p>Use in conjunction with the dynamic-profile statement at the same hierarchy levels to specify the routing instance in which to instantiate a dynamic PPPoE interface. You can associate a routing instance with a named service entry, empty service entry, or any service entry configured in a PPPoE service name table, or with an agent circuit identifier/agent remote identifier (ACI/ARI) pair defined for these services.</p> <p>The routing instance associated with a service entry in a PPPoE service name table overrides the routing instance associated with the PPPoE underlying interface on which the dynamic PPPoE interface is created.</p> <p>If you include the routing-instance statement at the <code>[edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i> agent-specifier aci <i>circuit-id-string</i> ari <i>remote-id-string</i>]</code> hierarchy level, you cannot also include the static-interface statement at this level. The routing-instance and static-interface statements are mutually exclusive for ACI/ARI pair configurations.</p>
Options	<i>routing-instance-name</i> —Name of the routing instance in which the router instantiates the dynamic PPPoE interface.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring PPPoE Service Name TablesAssigning a Dynamic Profile and Routing Instance to a Service Name or ACI/ARI Pair for Dynamic PPPoE Interface Creation

rpf-check (interfaces)

Syntax	<pre>rpf-check { fail-filter <i>filter-name</i>; mode loose; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Check whether traffic is arriving on an expected path. You can include this statement with the inet or inet6 protocol family only.</p> <p>The mode statement is explained separately.</p>
Options	fail-filter —A filter to evaluate when packets are received on the interface. If the RPF check fails, this optional filter is evaluated. If the fail filter is not configured, the default action is to silently discard the packet.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Unicast RPF Strict Mode on page 213• Configuring Unicast RPF Loose Mode on page 214

rtp

Syntax	<pre>rtp { f-max-period <i>number</i>; queues [<i>queue-numbers</i>]; port { minimum <i>port-number</i>; maximum <i>port-number</i>; } }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> compression]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the real-time transport protocol (RTP) properties for voice services traffic. The remaining statements are described separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

rts

Syntax	<pre>rts (assert de-assert normal);</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options dce-options], [edit interfaces <i>interface-name</i> serial-options dte-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For EIA-530 and V.35 interfaces only, configure the to-DCE signal, request to send (RTS).
Options	assert —The to-DCE signal must be asserted. de-assert —The to-DCE signal must be deasserted. normal —Normal RTS signal handling, as defined by the TIA/EIA Standard 530. Default: normal
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Serial Signal Handling on page 281

rts-polarity

Syntax	<code>rts-polarity (negative positive);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure RTS signal polarity.
Options	negative —Negative signal polarity. positive —Positive signal polarity. Default: positive
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Serial Signal Polarities on page 284

rtvbr

Syntax	<code>rtvbr peak rate sustained rate burst length;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i> shaping], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> shaping], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> shaping], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	<p>For ATM2 IQ PICs only, define the real-time variable bandwidth utilization in the traffic-shaping profile.</p> <p>When you configure the real-time bandwidth utilization, you must specify all three options (burst, peak, and sustained). You can specify the rate in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000). You can also specify the rate in cells per second by entering a decimal number followed by the abbreviation c; values expressed in cells per second are converted to bits per second using the formula 1 cps = 384 bps.</p>
Default	If the rtvbr statement is not included, bandwidth utilization is unlimited.
Options	<p>burst length—Burst length, in cells. If you set the length to 1, the peak traffic rate is used. Range: 1 through 4000 cells</p> <p>peak rate—Peak rate, in bits per second or cells per second. Range: For ATM2 IQ OC3 and OC12 interfaces, 33 Kbps through 542,526,792 bps. For ATM2 IQ OC48 interfaces, 33 Kbps through 2,170,107,168 bps. For ATM2 IQ DS3 and E3 interfaces, 33 Kbps through the maximum rate, which depends on the ATM encapsulation and framing you configure.</p> <p>sustained rate—Sustained rate, in bps or cps. Range: For ATM2 IQ OC3 and OC12 interfaces, 33 Kbps through 542,526,792 bps. For ATM2 IQ OC48 interfaces, 33 Kbps through 2,170,107,168 bps. For ATM2 IQ DS3 and E3 interfaces, from 33 Kbps through the maximum rate, which depends on the ATM encapsulation and framing you configure.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ATM CBRConfiguring ATM2 IQ Real-Time VBR

- [cbr on page 353](#)
- [vbr on page 783](#)

sa-multicast (100-Gigabit Ethernet)

Syntax	sa-multicast;
Hierarchy Level	[edit chassis fpc slot pic slot forwarding-mode]
Description	Configure the 100-Gigabit Ethernet PIC to interoperate with other Juniper Networks 100-Gigabit Ethernet PICs. See vlan-steering for information on interoperability with 100 gigabit Ethernet interfaces from other vendors.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring 100-Gigabit Ethernet PIC VLAN Steering Mode • forwarding-mode (100-Gigabit Ethernet) on page 453 • vlan-steering (100-Gigabit Ethernet) on page 796

sampling

Syntax	sampling <i>direction</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the direction of traffic to be sampled.
Options	<p><i>direction</i> can be one of the following:</p> <p>input—Configure at least one expected ingress point.</p> <p>output—Configure at least one expected egress point.</p> <p>input output—On a single interface, configure at least one expected ingress point and one expect egress point.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Junos OS Services Interfaces Configuration Guide

satop-options

Syntax	<pre>satop-options { excessive-packet-loss-rate { apply-groups <i>group-name</i> apply-groups-except <i>group-name</i> groups <i>group-name</i> sample-period <i>milliseconds</i> threshold <i>percentile</i> } idle-pattern <i>pattern</i> jitter-buffer-auto-adjust jitter-buffer-latency <i>milliseconds</i> jitter-buffer-packets <i>packets</i> payload-size <i>bytes</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Set Structure-Agnostic TDM over Packet (SAToP) protocol options.
Options	<p>excessive-packet-loss-rate options—Packet loss options.</p> <ul style="list-style-type: none">• apply-groups <i>group-name</i>—Groups from which to inherit configuration data.• apply-groups-except <i>group-name</i>—Don't inherit configuration data from these groups.• groups <i>group-name</i>—Specify groups.• sample-period <i>milliseconds</i>—Number of milliseconds over which excessive packet loss rate is calculated.• threshold <i>percentile</i>—Percentile designating the threshold of excessive packet loss rate (from 1 to 100). <p>idle-pattern <i>pattern</i>—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 to 255).</p> <p>jitter-buffer-auto-adjust—Automatically adjust the jitter buffer.</p> <p>jitter-buffer-latency <i>milliseconds</i>—Number of milliseconds delay in jitter buffer (from 1 to 1000 milliseconds).</p> <p>jitter-buffer-packets <i>packets</i>—Number of packets in jitter buffer (from 1 to 64).</p> <p>payload-size <i>bytes</i>—Payload size in integer number of bytes.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• ATM Support on Circuit Emulation PICs Overview

scheduler-maps

Syntax	<pre>scheduler-maps <i>map-name</i> { forwarding-class (<i>class-name</i> assured-forwarding best-effort expedited-forwarding network-control); vc-cos-mode (alternate strict); }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define CoS parameters assigned to forwarding classes.
Options	<p><i>map-name</i>—Name of the scheduler map.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring ATM2 IQ VC Tunnel CoS Components atm-scheduler-map on page 323 Junos OS Class of Service Configuration Guide

schedulers

Syntax	schedulers <i>number</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 8.2.
Description	Specify the number of schedulers for Ethernet IQ2 and IQ2-E PIC port interfaces.
Default	If you omit this statement, the 1024 schedulers are distributed equally over all ports in multiples of 4.
Options	<p><i>number</i>—Number of schedulers to configure on the port.</p> <p>Range: 1 through 1024</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Junos OS Class of Service Configuration Guide

secondary

Syntax	<code>secondary interface-name;</code>
Hierarchy Level	<code>[edit interfaces (rsp0 rsp1) redundancy-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the secondary (backup) AS PIC interface or MultiServices PIC interface.
Options	<i>interface-name</i> —The identifier for the AS PIC interface or MultiServices PIC interface, which must be of the form <i>sp-fpc/pic/port</i> .
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

send-critical-event

Syntax	<code>send-critical-event;</code>
Hierarchy Level	<code>[edit protocols oam ethernet link-fault-management action-profile action]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Send OAM PDUs with the critical event bit set.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Specifying the Actions to Be Taken for Link-Fault Management Events

serial-options

Syntax	<pre> serial-options { clock-rate <i>rate</i>; clocking-mode (dce loop); control-polarity (negative positive); cts-polarity (negative positive); dcd-polarity (negative positive); dce-options { control-signal (assert de-assert normal); cts (ignore normal require); dcd (ignore normal require); dsr (ignore normal require); dtr <i>signal-handling-option</i>; ignore-all; indication (ignore normal require); rts (assert de-assert normal); tm (ignore normal require); } dsr-polarity (negative positive); dte-options { control-signal (assert de-assert normal); cts (ignore normal require); dcd (ignore normal require); dsr (ignore normal require); dtr <i>signal-handling-option</i>; ignore-all; indication (ignore normal require); rts (assert de-assert normal); tm (ignore normal require); } dtr-circuit (balanced unbalanced); dtr-polarity (negative positive); encoding (nrz nrzi); indication-polarity (negative positive); line-protocol <i>protocol</i>; loopback (dce-local dce-remote local remote); rts-polarity (negative positive); tm-polarity (negative positive); transmit-clock invert; } </pre>
Hierarchy Level	[edit interfaces <i>se-pim</i> /O/ <i>port</i>]
Release Information	Statement introduced prior to Junos OS Release 7.4.
Description	<p>Configure serial-specific interface properties.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>

- Related Documentation**
- Serial Interfaces Overview on page 273
 - no-concatenate

server

Syntax	server;
Hierarchy Level	[edit interfaces pp0 unit <i>logical-unit-number</i> pppoe-options], [edit logical-systems <i>logical-system-name</i> interfaces pp0 unit <i>logical-unit-number</i> pppoe-options]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Configure the router to operate in the PPPoE server mode. Supported on M120 and M320 Multiservice Edge Routers and MX Series Universal Edge Routers operating as access concentrators.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the PPPoE Server Mode

server-timeout

Syntax	server-timeout <i>seconds</i> ;
Hierarchy Level	[edit protocols dot1x authenticator interface <i>interface-id</i>]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Sets the number of seconds the port waits for a reply when relaying a response from the client to the authentication server before timing out and invoking the server-fail action.
Options	seconds —The number of seconds the port waits for a response when relaying a request from the authentication server to the client before resending the request. Range: 1 through 60 seconds Default: 30 seconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IEEE 802.1x Port-Based Network Access Control Overview• authenticator on page 326• dot1x on page 405• interface (IEEE 802.1x) on page 495

service

See the following sections:

- **service (Logical Interfaces)** on page 693
- **service (PPPoE)** on page 694

service (Logical Interfaces)

Syntax	<pre> service { input { service-set <i>service-set-name</i> <service-filter <i>filter-name</i>>; post-service-filter <i>filter-name</i>; } output { service-set <i>service-set-name</i> <service-filter <i>filter-name</i>>; } } </pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Define one or more service sets and filters, and one postservice filter to be applied to an interface.
Options	The remaining statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Junos OS Services Interfaces Configuration Guide

service (PPPoE)

Syntax

```
service service-name {  
  drop;  
  delay seconds;  
  terminate;  
  dynamic-profile profile-name;  
  routing-instance routing-instance-name;  
  max-sessions number;  
  agent-specifier {  
    aci circuit-id-string ari remote-id-string {  
      drop;  
      delay seconds;  
      terminate;  
      dynamic-profile profile-name;  
      routing-instance routing-instance-name;  
      static-interface interface-name;  
    }  
  }  
}
```

Hierarchy Level [edit protocols pppoe service-name-tables table-name]

Release Information Statement introduced in Junos OS Release 10.0.
any, **dynamic-profile**, **routing-instance**, **max-sessions**, and **static-interface** options introduced in Junos OS Release 10.2.

Description Specify the action taken by the interface on receipt of a PPPoE Active Discovery Initiation (PADI) control packet for the specified named service, **empty** service, or **any** service in a PPPoE service name table. You can also specify the dynamic profile and routing instance that the router uses to instantiate a dynamic PPPoE interface, and the maximum number of active PPPoE sessions that the router can establish with the specified service.

Default The default action is terminate.

Options **service-name**—Service entry in the PPPoE service name table:

- **service-name**—Named service entry of up to 32 characters; for example, **premiumService**. You can configure a maximum of 512 named service entries across all PPPoE service name tables on the router.
- **empty**—Service entry of zero length that represents an unspecified service. Each PPPoE service name table includes one **empty** service entry by default.
- **any**—Default service for non-empty service entries that do not match the named or **empty** service entries configured in the PPPoE service name table. Each PPPoE service name table includes one **any** service entry by default.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

- Related Documentation**
- Configuring PPPoE Service Name Tables
 - Assigning a Service to a Service Name Table and Configuring the Action Taken When the Client Request Includes a Non-zero Service Name Tag
 - Configuring the Action Taken When the Client Request Includes an Empty Service Name Tag
 - Configuring the Action Taken for the Any Service

service-domain

Syntax	<code>service-domain (inside outside);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For adaptive services interfaces, specify a service interface domain. If you specify this interface using the next-hop-service statement at the [edit services service-set <i>service-set-name</i>] hierarchy level, the interface domain must match that used with the inside-service-interface and outside-service-interface statements.
Options	inside —Interface used within the network. outside —Interface used outside the network.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	• Junos OS Services Interfaces Configuration Guide

service-filter

Syntax	<code>service-filter <i>filter-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet service (input output)], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet service (input output)]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Define the filter to be applied to traffic before it is accepted for service processing. Configuration of a service filter is optional; if you include the service-set statement without a service-filter definition, the Junos OS assumes the match condition is true and selects the service set for processing automatically.
Options	<i>filter-name</i> —Identifies the filter to be applied in service processing.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

service-name

Syntax	<code>service-name <i>name</i>;</code>
Hierarchy Level	[edit interfaces pp0 unit <i>logical-unit-number</i> pppoe-options], [edit logical-systems <i>logical-system-name</i> interfaces pp0 unit <i>logical-unit-number</i> pppoe-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For J Series Services Routers with PPP over Ethernet interfaces, configure the service to be requested from the PPP over Ethernet server; that is, the access concentrator. For example, you can use this statement to indicate an Internet service provider (ISP) name or a class of service.
Options	<i>name</i> —Service to be requested from the PPP over Ethernet server.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the PPPoE Service Name• Junos OS Interfaces and Routing Configuration Guide

service-name-table

Syntax	<code>service-name-table <i>table-name</i>;</code>
Hierarchy Level	<p>[edit dynamic-profiles <i>profile-name</i> interfaces demux0 unit <i>logical-unit-number</i> family pppoe],</p> <p>[edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family pppoe],</p> <p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family pppoe],</p> <p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> pppoe-underlying-options],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family pppoe],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> pppoe-underlying-options]</p>
Release Information	<p>Statement introduced in Junos OS Release 10.0.</p> <p>(MX Series routers with Trio MPCs only) The [edit ... family pppoe] hierarchies introduced in Junos OS Release 11.2.</p>
Description	Specify the PPPoE service name table assigned to a PPPoE underlying interface. This underlying interface is configured with either the encapsulation ppp-over-ether statement or the family pppoe statement; the two statements are mutually exclusive.
Options	<i>table-name</i> —Name of the PPPoE service name table, a string of up to 32 alphanumeric characters.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring PPPoE Service Name Tables Assigning a Service Name Table to a PPPoE Underlying Interface Configuring the PPPoE Family for an Underlying Interface

service-name-tables

Syntax	<pre>service-name-tables <i>table-name</i> { service <i>service-name</i> { drop; delay <i>seconds</i>; terminate; dynamic-profile <i>profile-name</i>; routing-instance <i>routing-instance-name</i>; max-sessions <i>number</i>; agent-specifier { aci <i>circuit-id-string</i> ari <i>remote-id-string</i> { drop; delay <i>seconds</i>; terminate; dynamic-profile <i>profile-name</i>; routing-instance <i>routing-instance-name</i>; static-interface <i>interface-name</i>; } } } }</pre>
Hierarchy Level	[edit protocols pppoe]
Release Information	Statement introduced in Junos OS Release 10.0. dynamic-profile , routing-instance , max-sessions , and static-interface options introduced in Junos OS Release 10.2.
Description	Create and configure a PPPoE service name table. Specify the action taken for each service and remote access concentrator on receipt of a PPPoE Active Discovery Initiation (PADI) packet. You can also specify the dynamic profile and routing instance that the router uses to instantiate a dynamic PPPoE interface, and the maximum number of active PPPoE sessions that the router can establish with the specified service. A maximum of 32 PPPoE service name tables is supported per router.
Options	table-name —Name of the PPPoE service name table, a string of up to 32 alphanumeric characters. The remaining statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring PPPoE Service Name TablesCreating a Service Name Table

service-set

Syntax	<code>service-set <i>service-set-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet service (input output)], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet service (input output)]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Define one or more service sets to be applied to an interface. If you define multiple service sets, the Junos OS evaluates the filters in the order in which they appear in the configuration.
Options	<i>service-set-name</i> —Identifies the service set.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Junos OS Services Interfaces Configuration Guide

services

Syntax	<code>services priority-level;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> services-options syslog host <i>hostname</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify system logging priority level.
Options	<p><i>priority-level</i>—Assigns a priority level to the facility. Valid entries are as follows:</p> <ul style="list-style-type: none">• alert—Conditions that should be corrected immediately.• any—Matches any level.• emergency—Panic conditions.• critical—Critical conditions.• error—Error conditions.• info—Informational messages.• notice—Conditions that require special handling.• warning—Warning messages.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Junos OS Services Interfaces Configuration Guide

services-options

Syntax	<pre> services-options { inactivity-timeout <i>seconds</i>; open-timeout <i>seconds</i>; session-limit { maximum <i>number</i>; rate <i>new-sessions-per-second</i>; } syslog { host <i>hostname</i> { facility-override <i>facility-name</i>; log-prefix <i>prefix-number</i>; services <i>priority-level</i>; } } } </pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Define the service options to be applied on an interface.
Options	The remaining statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Junos OS Services Interfaces Configuration Guide

session-limit

Syntax	<pre>session-limit { maximum <i>number</i>; rate <i>new-sessions-per-second</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> services-options]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Restrict the maximum number of sessions and the session rate on Multiservices PICs.
Options	session-limit —Restricts the maximum number of sessions and the session rate for Multiservices PICs. The remaining statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

shaping

Syntax	<pre>shaping { (cbr <i>rate</i> rtvbr peak <i>rate</i> sustained <i>rate</i> burst <i>length</i> vbr peak <i>rate</i> sustained <i>rate</i> burst <i>length</i>); queue-length <i>number</i>; }</pre>
Hierarchy Level	<pre>[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i>]</pre>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p>
Description	<p>For ATM encapsulation only, define the traffic-shaping profile.</p> <p>For Circuit Emulation PICs, specify traffic shaping in the ingress and egress directions.</p> <p>For ATM2 IQ interfaces, changing or deleting VP tunnel traffic shaping causes all logical interfaces on a VP to be deleted and then re-added.</p> <p>VP tunnels are not supported on multipoint interfaces.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Defining Virtual Path Tunnels Defining the ATM Traffic-Shaping Profile Configuring ATM QoS or Shaping

shdsl-options

Syntax	<pre>shdsl-options { annex (annex-a annex-b); line-rate <i>line-rate</i>; loopback (local remote payload); snr-margin { current <i>margin</i>; snext <i>margin</i>; } }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 7.4.
Description	For J Series Services Routers only, configure symmetric DSL (SHDSL) options. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• ATM-over-SHDSL Overview

short-name-format

Syntax	short-name-format (character-string vlan 2octet rfc-2685-vpn-id);
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>domain-name</i> maintenance-association <i>ma-name</i>]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	Specify the name format of the maintenance association name.
Options	<p>character-string—The name is an ASCII character string.</p> <p>vlan—The primary VLAN identifier.</p> <p>2octet—A number in the range 0 through 65535.</p> <p>rfc-2685-vpn-id—A VPN identifier that complies with RFC 2685.</p> <p>Default: character-string</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Creating a Maintenance Association

short-sequence

Syntax	short-sequence;
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]</p>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For multilink interfaces only, set the length of the packet sequence identification number to 12 bits.
Default	If you omit this statement from the configuration, the length is set to 24 bits.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Junos OS Services Interfaces Configuration Guide

sla-iterator-profile

Syntax	<pre>sla-iterator-profile <i>profile-name</i> { data-tlv-size <i>size</i>; iteration-count <i>count-value</i>; priority <i>priority-value</i>; }</pre>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>md-name</i> maintenance-association <i>ma-name</i> mep <i>mep-id</i> remote-mep <i>remote-mep-id</i>]
Release Information	Statement introduced in Junos OS Release 11.1.
Description	Configure a remote MEP with an iterator profile and specify the options.
Options	<p><i>profile-name</i>—Name of the iterator profile configured for a remote MEP. For more information about configuring a remote MEP with an iterator profile, see Configuring a Remote MEP with an Iterator Profile.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	Configure—To enter configuration mode. Control—To modify any configuration.
Related Documentation	<ul style="list-style-type: none">• Clearing Iterator Statistics• Configuring an Iterator Profile• Configuring a Remote MEP with an Iterator Profile• Example: Configuring an Iterator• Displaying Iterator Statistics• Managing Iterator Statistics• sla-iterator-profiles on page 707

sla-iterator-profiles

Syntax	<pre>sla-iterator-profiles { profile-name { calculation-weight { delay delay-weight; delay-variation delay-variation-weight; } cycle-time milliseconds; iteration-period iteration-period-value; measurement-type (loss statistical-frame-loss two-way-delay); } }</pre>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management performance-monitoring]
Release Information	Statement introduced in Junos OS Release 11.1.
Description	Configure an iterator application and specify the iterator profile options.
Options	<p>profile-name—Name of the iterator profile. For more information about configuring the iterator profile, see Configuring an Iterator Profile.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>Configure—To enter configuration mode.</p> <p>Control—To modify any configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Clearing Iterator Statistics • Configuring an Iterator Profile • Configuring a Remote MEP with an Iterator Profile • Example: Configuring an Iterator • Displaying Iterator Statistics • Managing Iterator Statistics

snext

Syntax	<code>snext margin;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> shdsl-options snr-margin], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> shdsl-options snr-margin]
Release Information	Statement introduced in Junos OS Release 7.4.
Description	For J Series Services Routers only, configure self-near-end crosstalk (SNEXT) signal-to-noise ratio (SNR) margin for a SHDSL line. When configured, the line trains at higher than SNEXT threshold. The SNR margin is the difference between the desired SNR and the actual SNR.
Options	margin —Desired SNEXT margin. Possible values are disabled or a margin between –10dB and 10 dB. Default: disabled
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• ATM-over-SHDSL Overview• <i>Junos OS Interfaces and Routing Configuration Guide</i>

snr-margin

Syntax	snr-margin { current <i>margin</i> ; snext <i>margin</i> ; }
Hierarchy Level	[edit interfaces <i>interface-name</i> shdsl-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> shdsl-options]
Release Information	Statement introduced in Junos OS Release 7.4.
Description	<p>For J Series Services Routers only, configure the SHDSL signal-to-noise ratio (SNR) margin. The SNR margin is the difference between the desired SNR and the actual SNR. Configuring the SNR creates a more stable SHDSL connection by making the line train at a SNR margin higher than the threshold. If any external noise below the threshold is applied to the line, the line remains stable.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • ATM-over-SHDSL Overview • <i>Junos OS Interfaces and Routing Configuration Guide</i>

sonet-options

```
Syntax  sonet-options {  
        aps {  
            advertise-interval milliseconds;  
            annex-b  
            authentication-key key;  
            force;  
            hold-time milliseconds;  
            lockout;  
            neighbor address;  
            paired-group group-name;  
            protect-circuit group-name;  
            request;  
            revert-time seconds;  
            switching-mode (bidirectional | unidirectional);  
            working-circuit group-name;  
        }  
        bytes {  
            c2 value;  
            e1-quiet value;  
            f1 value;  
            f2 value;  
            s1 value;  
            z3 value;  
            z4 value;  
        }  
        fcs (16 | 32);  
        loopback (local | remote);  
        mpls {  
            pop-all-labels {  
                required-depth number;  
            }  
        }  
        path-trace trace-string;  
        (payload-scrambler | no-payload-scrambler);  
        rfc-2615;  
        trigger {  
            defect ignore;  
            defect hold-time up milliseconds down milliseconds;  
        }  
    }  
    vtmapping (itu-t | klm);  
    (z0-increment | no-z0-increment);
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure SONET/SDH-specific interface properties.

On SONET/SDH OC48 interfaces that you configure for channelized (multiplexed) mode (by including the **no-concatenate** statement at the [edit chassis fpc *slot-number* pic *pic-number*] hierarchy level), the **bytes e1-quiet** and **bytes f1** options have no effect. The

bytes f2, **bytes z3**, **bytes z4**, and **path-trace** options work correctly on channel 0 and work in the transmit direction only on channels 1, 2, and 3.

On a channelized OC12 interface, the **bytes e1-quiet**, **bytes f1**, **bytes f2**, **bytes z3**, and **bytes z4** options are not supported. The **fcs** and **payload-scrambler** statements are also not supported; you must configure these for each DS3 channel using the **t3-options fcs** and **t3-options payload-scrambler** statements. The **aps** and **loopback** statements are supported only on channel 0 and are ignored if included in the configurations for channels 1 through 11. You can configure loopbacks for each DS3 channel with the **t3-options loopback** statement. The **path-trace** statement can be included in the configuration for each DS3 channel, thereby configuring a unique path trace for each channel.

To configure loopback on channelized IQ and IQE PICs, SONET/SDH level, use the **loopback** statement **local** and **remote** options at the controller interface (coc48, cstm16, coc12, cstm4, coc3, and cstm1). It is ignored for path-level interfaces *so-fpc/pic/port* or *so-fpc/pic/port:channel*.

If you are running Intermediate System-to-Intermediate System (IS-IS) over SONET/SDH interfaces, use PPP if you are running Cisco IOS Release 12.0 or later. If you need to run HDLC, configure an ISO family MTU of 4469 on the router.

The statements are explained separately.

Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring SONET/SDH Parameters on ATM Interfaces • Channelized OC12/STM4 IQ and IQE Interfaces Overview • Channelized STM1 Interfaces Overview • Configuring SONET/SDH Physical Interface Properties • no-concatenate

source

Syntax	<code>source source-address;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel <i>address</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the source address of the tunnel.
Default	If you do not specify a source address, the tunnel uses the unit's primary address as the source address of the tunnel.
Options	<i>source-address</i> —Address of the local side of the tunnel. This is the address that is placed in the outer IP header's source field.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• multicast-only on page 578• primary (Address on Interface) on page 654• Junos OS Services Interfaces Configuration Guide

source-address-filter

Syntax	source-address-filter { <i>mac-address</i> ; }
Hierarchy Level	[edit interfaces <i>interface-name</i> aggregated-ether-options], [edit interfaces <i>interface-name</i> fastether-options], [edit interfaces <i>interface-name</i> gigether-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For aggregated Ethernet, Fast Ethernet, Gigabit Ethernet, Gigabit Ethernet IQ interfaces, and Gigabit Ethernet PICs with SFPs (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), specify the MAC addresses from which the interface can receive packets. For this statement to have any effect, you must include the source-filtering statement in the configuration to enable source address filtering. This statement is not supported on the J Series Services Routers.
Options	<p>mac-address—MAC address filter. You can specify the MAC address as <i>nn:nn:nn:nn:nn:nn</i> or <i>nnnn.nnnn.nnnn</i>, where <i>n</i> is a decimal digit. To specify more than one address, include multiple mac-address options in the source-address-filter statement.</p> <p>If you enable the VRRP on a Fast Ethernet or Gigabit Ethernet interface, as described in VRRP and VRRP for IPv6 Overview, and if you enable MAC source address filtering on the interface, you must include the virtual MAC address in the list of source MAC addresses that you specify in the source-address-filter statement. MAC addresses ranging from 00:00:5e:00:01:00 through 00:00:5e:00:01:ff are reserved for VRRP, as defined in RFC 3768, <i>Virtual Router Redundancy Protocol</i>. When you configure the VRRP group, the group number must be the decimal equivalent of the last hexadecimal byte of the virtual MAC address.</p> <p>On untagged Gigabit Ethernet interfaces you should not configure the source-address-filter statement and the accept-source-mac statement simultaneously. On tagged Gigabit Ethernet interfaces you should not configure the source-address-filter statement and the accept-source-mac statement with an identical MAC address specified in both filters.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Enabling Ethernet MAC Address Filtering source-filtering on page 715

source-class-usage

Syntax	<pre>source-class-usage { direction; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet accounting], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet accounting]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Enable packet counters on an interface that count packets that arrive from specific prefixes on the provider core router and are destined for specific prefixes on the customer edge router.
Options	<p><i>direction</i> can be one of the following:</p> <p>input—Configure at least one expected ingress point.</p> <p>output—Configure at least one expected egress point.</p> <p>input output—On a single interface, configure at least one expected ingress point and one expect egress point.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Enabling Source Class and Destination Class Usage on page 218• accounting on page 296• destination-class-usage on page 395• Junos OS Services Interfaces Configuration Guide

source-filtering

Syntax	(source-filtering no-source-filtering);
Hierarchy Level	[edit interfaces <i>interface-name</i> aggregated-ether-options], [edit interfaces <i>interface-name</i> fastether-options], [edit interfaces <i>interface-name</i> gigether-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For aggregated Ethernet, Fast Ethernet, Gigabit Ethernet, and Gigabit Ethernet IQ interfaces only, enable the filtering of MAC source addresses, which blocks all incoming packets to that interface. To allow the interface to receive packets from specific MAC addresses, include the source-address-filter statement.</p> <p>If the remote Ethernet card is changed, the interface is no longer able to receive packets from the new card because it has a different MAC address.</p>
Default	Source address filtering is disabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Enabling Ethernet MAC Address Filtering • accept-source-mac on page 293 • source-address-filter on page 713

speed


See the following sections:

- **speed (Ethernet)** on page 716
- **speed (MX Series DPC)** on page 717
- **speed (SONET/SDH)** on page 718

speed (Ethernet)

Syntax	<code>speed (10m 100m 1g auto);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i>], [edit interfaces <i>ge-pim/0/0</i> switch-options switch-port <i>port-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the interface speed. This statement applies to the management Ethernet interface (fxp0 or em0), Fast Ethernet 12-port and 48-port PICs, the built-in Fast Ethernet port on the FIC (M7i router), the built-in Ethernet interfaces on J Series Services Routers, Combo Line Rate DPCs and Tri-Rate Ethernet Copper interfaces on MX Series routers, and on the Gigabit Ethernet ports on J Series Services Routers with uPIMs installed and configured for access switching mode. When you configure the Tri-Rate Ethernet copper interface to operate at 1 Gbps, autonegotiation must be enabled. When you configure 100BASE-FX SFP, you must set the port speed at 100 Mbps.
Options	You can specify the speed as either 10m (10 Mbps), 100m (100 Mbps), or on J Series routers with uPIMs installed and on MX Series routers, 1g (1 Gbps). You can specify the auto option only on MX Series routers.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the Interface Speed on page 132• Configuring the Interface Speed on Ethernet Interfaces• Configuring Gigabit Ethernet Autonegotiation• Configuring J Series Services Router Switching Interfaces

speed (MX Series DPC)

Syntax	<code>speed (auto 1Gbps 100Mbps 10Mbps);</code>
Hierarchy Level	[edit interfaces <i>ge-fpc/pic/port</i>]
Release Information	Statement introduced in Junos OS Release 9.5.
Description	On MX Series routers with Combo Line Rate DPCs and Tri-Rate Copper SFPs you can set auto negotiation of speed. To specify the auto negotiation speed, use the speed (auto 1Gbps 100Mbps 10Mbps) statement under the [edit interface <i>ge-/fpc/pic/port</i>] hierarchy level. The auto option will attempt to automatically match the rate of the connected interface. To set port speed negotiation to a specific rate, set the port speed to 1Gbps , 100Mbps , or 10Mbps .
	<div>  <p>NOTE: If the negotiated speed and the interface speed do not match, the link will not be brought up. Half duplex mode is not supported.</p> </div>
Options	You can specify the speed as either auto (autonegotiate), 10Mbps (10 Mbps), 100Mbps (100 Mbps), or 1Gbps (1 Gbps).
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Gigabit Ethernet Autonegotiation no-auto-mdix on page 592

speed (SONET/SDH)

Syntax	<code>speed (oc3 oc12 oc48);</code>
Hierarchy Level	<code>[edit interfaces so-fpc/pic/port],</code> <code>[edit interfaces so-fpc/pic/port:channel]</code>
Release Information	Statement introduced in Junos OS Release 8.3.
Description	Configure the interface speed. This statement applies to SONET/SDH interfaces on next-generation SONET/SDH Type 1 and Type 2 PICs with SFP. Available speeds depend on whether the PIC is in concatenated mode or nonconcatenated mode. Include the channel in the interface name when configuring nonconcatenated interfaces.
Options	oc3 oc12 oc48 —Speed when the PIC is in concatenated mode. For example, you can configure each port of a 4-port OC12 PIC to have a speed of oc3 . You can configure port 0 of a 4-port OC12 PIC to have a speed of oc12 . oc3 oc12 —Speed when the PIC is in nonconcatenated mode.
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring SONET/SDH Interface Speed

spid1

Syntax	<code>spid1 spid1-string;</code>
Hierarchy Level	<code>[edit interfaces br-pim/O/port isdn-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the Service Profile Identifier (SPID).
Options	spid1-string —Numeric SPID.
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ISDN Physical Interface PropertiesJunos OS Interfaces and Routing Configuration Guide

spid2

Syntax	<code>spid2 <i>spid2-string</i>;</code>
Hierarchy Level	[edit interfaces <i>br-pim</i> /0/ <i>port</i> isdn-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure an additional SPID.
Options	<i>spid2-string</i> —Numeric SPID.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ISDN Physical Interface Properties<i>J Series Services Router Configuration Guide</i>

stacked-vlan-ranges

Syntax stacked-vlan-ranges {
 access-profile *profile-name*;
 authentication {
 password *password-string*;
 username-include {
 circuit-type;
 delimiter *delimiter-character*;
 domain-name *domain-name-string*;
 interface-name;
 mac-address;
 option-82;
 radius-realm *radius-realm-string*;
 user-prefix *user-prefix-string*;
 }
 }
 dynamic-profile *profile-name* {
 accept (any | dhcp-v4 | inet);
 ranges (any | *low-tag-high-tag*), (any | *low-tag-high-tag*);
 }
 override;
 }

Hierarchy Level [edit interfaces *interface-name* auto-configure]

Release Information Statement introduced in Junos OS Release 9.5.

Description Configure multiple VLANs. Each VLAN is assigned a VLAN ID number from the range.

Options **any**—Any valid VLAN ID number.

vlan-id-low—Specify the first VLAN ID number for the group of VLANs.

vlan-id-high—Specify the last VLAN ID number for the group of VLANs.

Range: 1 through 4094

 The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
 routing-control—To add this statement to the configuration.


Related Documentation

- Configuring Stacked VLAN Ranges for Use with Stacked VLAN Dynamic Profiles
- Configuring Dynamic Mixed VLAN Ranges

stacked-vlan-tagging

Syntax	stacked-vlan-tagging;
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Gigabit Ethernet IQ interfaces, enable stacked VLAN tagging for all logical interfaces on the physical interface.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Stacking and Rewriting Gigabit Ethernet VLAN Tags Overviewvlan-tags (Stacked VLAN Tags) on page 801

start-end-flag

Syntax	start-end-flag (filler shared);
Hierarchy Level	[edit interfaces e1- <i>fpc/pic/port</i>], [edit interfaces t1- <i>fpc/pic/port</i>], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> e1-options], [edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> t1-options], [edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For DS0, E1, E3, T1, and T3 interfaces, configure the interface to share the transmission of start and end flags.
	<div> NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the start-end-flag statement must be included at the [edit interfaces e1-<i>fpc/pic/port</i>] or [edit interfaces t1-<i>fpc/pic/port</i>] hierarchy level as appropriate.</div>
Options	filler —Wait two idle cycles between the start and end flags. shared —Share the transmission of the start and end flags. This is the default.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring E1 Start and End Flags• Configuring the E3 Start and End Flags• Configuring T1 Start and End Flags• Configuring T3 Start and End Flags

static-interface

Syntax	<code>static-interface <i>interface-name</i>;</code>
Hierarchy Level	[edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i> agent-specifier aci <i>circuit-id-string</i> ari <i>remote-id-string</i>]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	<p>Reserve the specified static PPPoE interface for use only by the PPPoE client with matching agent circuit identifier (ACI) and agent remote identifier (ARI) information. You can specify only one static interface per ACI/ARI pair configured for a named service entry, empty service entry, or any service entry in the PPPoE service name table.</p> <p>The static interface associated with an ACI/ARI pair takes precedence over the general pool of static interfaces associated with the PPPoE underlying interface.</p> <p>If you include the static-interface statement in the configuration, you cannot also include either the dynamic-profile statement or the routing-instance statement. The dynamic-profile, routing-instance, and static-interface statements are mutually exclusive for ACI/ARI pair configurations.</p>
Options	<i>interface-name</i> —Name of the static PPPoE interface reserved for use by the PPPoE client with matching ACI/ARI information. Specify the interface in the format pp0.<i>logical</i> , where <i>logical</i> is a logical unit number from 0 through 16385 for static interfaces.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring PPPoE Service Name Tables Reserving a Static PPPoE Interface for Exclusive Use by a PPPoE Client

static-tei-val

Syntax	<code>static-tei-val value;</code>
Hierarchy Level	[edit interfaces <i>br-pim</i> /0/ <i>port</i> isdn-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For J Series Services Routers only. Statically configure the Terminal Endpoint Identifier (TEI) value. The TEI value represents any ISDN-capable device attached to an ISDN network that is the terminal endpoint. TEIs are used to distinguish between several different devices using the same ISDN links.
Options	value —Value between 0 through 63.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ISDN Physical Interface Properties<i>Junos OS Interfaces and Routing Configuration Guide</i>

supplicant

Syntax	<code>supplicant single;</code>
Hierarchy Level	[edit protocols dot1x authenticator interface <i>interface-id</i>]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	<p>Specify the supplicant mode. Only single mode is supported.</p> <p>This option will authenticate only the first client that connects to a port. All other clients that connect later (802.1x compliant or non-compliant) will be allowed free access on that port without any further authentication. If the first authenticated client logs out, all other users are locked out until a client authenticates again.</p>
Options	single —Sets single mode.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">IEEE 802.1x Port-Based Network Access Control Overviewauthenticator on page 326dot1x on page 405interface (IEEE 802.1x) on page 495

supplicant-timeout

Syntax	<code>supplicant-timeout <i>seconds</i>;</code>
Hierarchy Level	<code>[edit protocols dot1x authenticator interface <i>interface-id</i>]</code>
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Specify the number of seconds the port waits for a response when relaying a request from the authentication server to the client before resending the request.
Options	<p><i>seconds</i>—Specify the number of seconds the port waits for the supplicant timeout.</p> <p>Range: 1 through 60 seconds</p> <p>Default: 30 seconds</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • IEEE 802.1x Port-Based Network Access Control Overview • authenticator on page 326 • dot1x on page 405 • interface (IEEE 802.1x) on page 495

swap

Syntax	<code>swap;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map],</code> <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Gigabit Ethernet IQ and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and aggregated Ethernet using Gigabit Ethernet IQ interfaces, specify the VLAN rewrite operation to replace a VLAN tag. The outer VLAN tag of the frame is overwritten with the user-specified VLAN tag information.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Rewriting the VLAN Tag on Tagged Frames

swap-push

Syntax	swap-push;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map]
Release Information	Statement introduced in Junos OS Release 8.1.
Description	For Gigabit Ethernet IQ, IQ2 and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and for aggregated Ethernet interfaces using Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet PICs on MX Series routers, specify the VLAN rewrite operation to replace the outer VLAN tag of the frame with a user-specified VLAN tag value. A user-specified outer VLAN tag is pushed in front. The outer tag becomes an inner tag in the final frame.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Rewriting a VLAN Tag and Adding a New Tag

swap-swap

Syntax	swap-swap;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map]
Release Information	Statement introduced in Junos OS Release 8.1.
Description	For Gigabit Ethernet IQ, IQ2 and IQ2-E interfaces, 10-Gigabit Ethernet LAN/WAN PIC, and for aggregated Ethernet interfaces using Gigabit Ethernet IQ2 and IQ2-E or 10-Gigabit Ethernet PICs on MX Series routers, specify the VLAN rewrite operation to replace both the inner and the outer VLAN tags of the frame with a user-specified VLAN tag value.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Rewriting the Inner and Outer VLAN Tags

switch-options

Syntax	<pre>switch-options { switch-port <i>port-number</i> { (auto-negotiation no-auto-negotiation); speed (10m 100m 1g); link-mode (full-duplex half-duplex); } }</pre>
Hierarchy Level	[edit interfaces <i>ge-pim</i> /0/0]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	On a J Series Services Router with multiport Gigabit Ethernet uPIMs installed and operating in access switching mode, only one physical interface is configured for the entire multiport Gigabit Ethernet uPIM. Configuration of the physical port characteristics is done under the single physical interface.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring J Series Services Router Switching Interfaces

switch-port

Syntax	<pre>switch-port <i>port-number</i> { (auto-negotiation no-auto-negotiation); speed (10m 100m 1g); link-mode (full-duplex half-duplex); }</pre>
Hierarchy Level	[edit interfaces <i>ge-pim</i> /0/0 switch-options]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	On a J Series Services Router with Ethernet uPIMs installed and operating in access switching mode, configuration of the physical port characteristics, done under the single physical interface.
Default	Autonegotiation is enabled by default. If the link speed and duplex are also configured, the interfaces use the values configured as the desired values in the negotiation.
Options	<p><i>port-number</i>—Ports are numbered 0 through 5 on the 6-port Gigabit Ethernet uPIM, 0 through 7 on the 8-port Gigabit Ethernet uPIM, and 0 through 15 on the 16-port Gigabit Ethernet uPIM.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">Configuring J Series Services Router Switching Interfaces

switch-type

Syntax	switch-type (att5e etsi ni1 ntdms-100)
Hierarchy Level	[edit interfaces br-pim/0/port isdn-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For J Series Services Routers only. Configure the ISDN variant supported.
Options	<p>att5e—AT&T switch variant.</p> <p>etsi—European Telecommunications Standards Institute switch variant.</p> <p>ni1—National ISDN 1 switch variant.</p> <p>ntdms-100—Northern Telecom DMS-100.</p> <p>ntt—NTT Group switch for Japan.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• ISDN Interfaces Overview• <i>Junos OS Interfaces and Routing Configuration Guide</i>

switching-mode

Syntax	switching-mode (bidirectional unidirectional);
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For unchannelized OC3, OC12, and OC48 SONET/SDH interfaces on T Series routers only, configure the interface to interoperate with SONET/SDH line-terminating equipment (LTE) that is provisioned for unidirectional linear APS in 1+1 architecture.
Default	If the switching-mode statement is not configured, the mode is bidirectional, and the interface does not interoperate with a unidirectional SONET/SDH LTE.
Options	bidirectional —Support bidirectional mode only. unidirectional —Interoperate with a SONET/SDH LTE provisioned for unidirectional mode.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Unidirectional Switching Mode Support

symbol-period

Syntax	<code>symbol-period count;</code>
Hierarchy Level	[edit protocols oam ethernet link-fault-management action-profile event, link-event-rate], [edit protocols oam link-fault-management interface <i>interface-name</i> event-thresholds]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	<p>Configure the threshold for sending symbol period events or taking the action specified in the action profile.</p> <p>A symbol error is any symbol code error on the underlying physical layer. The symbol period threshold is reached when the number of symbol errors reaches the configured value within the period window. The default period window is the number of symbols that can be transmitted on the underlying physical layer in 1 second. The window is not configurable.</p>
Options	<p>count—Threshold count for symbol period events.</p> <p>Range: 1 through 100</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring Threshold Values for Local Fault Events on an Interface• Configuring Threshold Values for Fault Events in an Action Profile

syslog

See the following sections:

- [syslog \(Interfaces\) on page 732](#)
- [syslog \(Monitoring\) on page 733](#)
- [syslog \(OAM Action\) on page 733](#)

syslog (Interfaces)

Syntax

```
syslog {  
  host hostname {  
    facility-override facility-name;  
    log-prefix prefix-number;  
    services priority-level;  
  }  
}
```

Hierarchy Level [edit interfaces *interface-name* services-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description For adaptive services interfaces, configure generation of system log messages for the service set. System log information is passed to the kernel for logging in the **/var/log** directory. Any values configured in the service set definition override these values.

Options The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- [Junos OS Services Interfaces Configuration Guide](#)

syslog (Monitoring)

Syntax	(syslog no-syslog);
Hierarchy Level	[edit interfaces mo- <i>fpc/pic/port</i> multiservice-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>System logging is enabled by default. The system log information of the Monitoring Services PIC is passed to the kernel for logging in the <code>/var/log</code> directory.</p> <ul style="list-style-type: none">• syslog—Enable PIC system logging.• no-syslog—Disable PIC system logging.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring Multiservice Physical Interface Properties on page 147• Junos OS Services Interfaces Configuration Guide

syslog (OAM Action)

Syntax	syslog;
Hierarchy Level	[edit protocols oam ethernet link-fault-management action-profile action]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Generate a syslog message for the Ethernet Operation, Administration, and Management (OAM) event.
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Specifying the Actions to Be Taken for Link-Fault Management Events

system-priority

Syntax	<code>system-priority <i>priority</i>;</code>
Hierarchy Level	[edit interfaces aeX aggregated-ether-options lacp]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Define LACP system priority at the aggregated Ethernet interface level. This system priority value takes precedence over a system priority value configured at the global [edit chassis] hierarchy level.
Options	<p>priority—Priority for the aggregated Ethernet system. A smaller value indicates a higher priority.</p> <p>Range: 0 through 65535</p> <p>Default: 127</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>

t1-options

Syntax	<pre> t1-options { bert-algorithm <i>algorithm</i>; bert-error-rate <i>rate</i>; bert-period <i>seconds</i>; buildout <i>value</i>; byte-encoding (nx56 nx64); crc-major-alarm-threshold (1e-3 5e-4 1e-4 5e-5 1e-5); crc-minor-alarm-threshold (1e-3 5e-4 1e-4 5e-5 1e-5 5e-6 1e-6); fcs (16 32); framing (esf sf); idle-cycle-flag (flags ones); invert-data; line-encoding (ami b8zs); loopback (local payload remote); remote-loopback-respond; start-end-flag (filler shared); timeslots <i>time-slot-range</i>; } </pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure T1-specific physical interface properties.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> T1 Interfaces Overview

t310

Syntax	t310-value <i>seconds</i> ;
Hierarchy Level	[edit interfaces <i>br-pim/O/port</i> isdn-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ISDN interfaces, configure the Q.931-specific timer for T310, in seconds. The Q.931 protocol is involved in the setup and termination of connections.
Options	seconds —Timer value, in seconds. Range: 1 through 65536 seconds Default: 10 seconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ISDN Physical Interface Properties<i>Junos OS Interfaces and Routing Configuration Guide</i>

t391

Syntax	t391 <i>seconds</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For link services and voices interfaces only, set Frame Relay link integrity polling interval.
Options	seconds —Link integrity polling interval. Range: 5 through 30 seconds Default: 10 seconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">n391 on page 584n392 on page 585n393 on page 586t392 on page 737<i>Junos OS Services Interfaces Configuration Guide</i>

t392

Syntax	t392 <i>seconds</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For link services and voices interfaces only, set Frame Relay polling verification interval.
Options	<i>seconds</i> —Polling verification interval. Range: 5 through 30 seconds Default: 15 seconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• n391 on page 584• n392 on page 585• n393 on page 586• t391 on page 736• timeslots on page 744• Junos OS Services Interfaces Configuration Guide

t3-options

Syntax t3-options {
 atm-encapsulation (direct | plcp);
 bert-algorithm *algorithm*;
 bert-error-rate *rate*;
 bert-period *seconds*;
 (cbit-parity | no-cbit-parity);
 compatibility-mode (digital-link | kentrox | larscom) <subrate *value*>;
 fcs (16 | 32);
 (feac-loop-respond | no-feac-loop-respond);
 idle-cycle-flag *value*;
 (long-buildout | no-long-buildout);
 (loop-timing | no-loop-timing);
 loopback (local | payload | remote);
 start-end-flag *value*;
 }

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure T3-specific physical interface properties, including the properties of DS3 channels on a channelized OC12 interface. The **long-buildout** statement is not supported for DS3 channels on a channelized OC12 interface.

On T3 interfaces, the default encapsulation is PPP.

For ATM1 interfaces, you can configure a subset of E3 options statements.

The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

Related Documentation • T3 Interfaces Overview

tag-protocol-id

See the following sections:

- **tag-protocol-id (TPIDs Expected to Be Sent or Received)** on page 739
- **tag-protocol-id (TPID to Rewrite)** on page 740

tag-protocol-id (TPIDs Expected to Be Sent or Received)

Syntax	<code>tag-protocol-id [<i>tpids</i>];</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> gether-options ethernet-switch-profile], [edit interfaces <i>interface-name</i> aggregated-ether-options ethernet-switch-profile]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Gigabit Ethernet IQ and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces, aggregated Ethernet with Gigabit Ethernet IQ interfaces, and Gigabit Ethernet PICs with SFPs (except the 10-port Gigabit Ethernet PIC, and the built-in Gigabit Ethernet port on the M7i router), define the TPIDs expected to be sent or received on a particular VLAN. For each Gigabit Ethernet port, you can configure up to eight TPIDs using the tag-protocol-id statement; but only the first four TPIDs are supported on IQ2 and IQ2-E interfaces. For 10-Gigabit Ethernet LAN/WAN PIC interfaces on T Series routers, only the default TPID value (0x8100) is supported.
Options	<i>tpids</i> —TPIDs to be accepted on the VLAN. Specify TPIDs in hexadecimal.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Frames with Particular TPIDs to Be Processed as Tagged Frames

tag-protocol-id (TPID to Rewrite)

Syntax	<code>tag-protocol-id <i>tpid</i>;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map],</code> <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i></code> <code>input-vlan-map],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i></code> <code>output-vlan-map]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For Gigabit Ethernet IQ and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces only, configure the outer TPID value. All TPIDs you include in input and output VLAN maps must be among those you specify at the <code>[edit interfaces <i>interface-name</i> together-options ethernet-switch-profile tag-protocol-id [<i>tpids</i>]]</code> hierarchy level.</p> <p>For 10-Gigabit Ethernet LAN/WAN PIC interfaces on T Series routers, value the default TPID value (0x8100) is supported.</p>
Default	If the <code>tag-protocol-id</code> statement is not configured, the TPID value is 0x8100.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Inner and Outer TPIDs and VLAN IDs

targeted-broadcast

Syntax	targeted-broadcast { forward-and-send-to-re; forward-only; }
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet]
Release Information	Statement introduced in Junos OS Release 10.2.
Description	Specify the IP packets destined for a Layer 3 broadcast address to be forwarded to both an egress interface and the Routing Engine, or to an egress interface only. The packets are broadcast only if the egress interface is a LAN interface. The statements are explained separately.
Default	When this statement is not included, broadcast packets are sent to the Routing Engine only.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Targeted Broadcast on page 227 Example: Configuring Targeted Broadcast on page 228 Understanding Targeted Broadcast on page 226

targeted-distribution (Demux Interfaces over Aggregated Ethernet)

Syntax	targeted-distribution;
Hierarchy Level	[edit interfaces demux0 unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 11.2.
Description	Configure egress data for a logical interface to be sent across a single member link in an aggregated Ethernet bundle. A backup link is provisioned with CoS scheduling resources in the event that the primary assigned link goes down. The aggregated Ethernet interface must be configured without link protection.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces

tei-option

Syntax	<code>tei-option (first-call power-up);</code>
Hierarchy Level	<code>[edit interfaces br-pim/O/port isdn-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ISDN interfaces, configure when the Terminal Endpoint Identifier (TEI) negotiates with the ISDN provider.
Options	first-call —Activation does not occur until the call setup is sent. power-up —Activation occurs when the Services Router is powered on. Default: power-up
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ISDN Physical Interface Properties<i>Junos OS Interfaces and Routing Configuration Guide</i>

terminate (PPPoE Service Name Tables)

Syntax	<code>terminate;</code>
Hierarchy Level	<code>[edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i>],</code> <code>[edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i> agent-specifier</code> <code>aci <i>circuit-id-string</i> ari <i>remote-id-string</i>]</code>
Release Information	Statement introduced in Junos OS Release 10.0. Support at <code>[edit protocols pppoe service-name-tables <i>table-name</i> service <i>service-name</i> agent-specifier aci <i>circuit-id-string</i> ari <i>remote-id-string</i>]</code> hierarchy level introduced in Junos OS Release 10.2.
Description	Direct the router to immediately respond to a PPPoE Active Discovery Initiation (PADI) control packet received from a PPPoE client by sending the client a PPPoE Active Discovery Offer (PADO) packet. The PADO packet contains the name of the access concentrator (router) that can service the client request. The terminate action is the default action for a named service entry, empty service entry, any service entry, or agent circuit identifier/agent remote identifier (ACI/ARI) pair in a PPPoE service name table.
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring PPPoE Service Name Tables

then

Syntax	then { discard; }
Hierarchy Level	[edit firewall hierarchical-policer aggregate], [edit firewall hierarchical-policer premium]
Release Information	Statement introduced in Junos OS Release 9.5.
Description	On M40e, M120, and M320 (with FFPC and SFPC) edge routers and T320, T640, and T1600 core routers with Enhanced Intelligent Queuing (IQE) PICs, discard packets when a specified bandwidth or burst limits for an aggregate level of a hierarchical policer is reached.
Options	discard —Discard packets if condition is met.
Required Privilege Level	firewall—To view this statement in the configuration. firewall-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Applying Policers on page 199 Junos OS Class of Service Configuration Guide

threshold

Syntax	threshold <i>bytes</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the bucket threshold, which controls the burstiness of the leaky bucket mechanism. The larger the value, the more bursty the traffic, which means that over a very short amount of time, the interface can receive or transmit close to line rate, but the average over a longer time is at the configured bucket rate.
Options	<p>bytes—Maximum size, in bytes, for traffic bursts. For ease of entry, you can enter <i>number</i> either as a complete decimal number or as a decimal number followed by the abbreviation k (1000). For example, the entry threshold 2k corresponds to a threshold of 2000 bytes.</p> <p>Range: 0 through 65,535 bytes</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Receive and Transmit Leaky Bucket Properties on page 138 Configuring Receive and Transmit Leaky Bucket Properties on SONET/SDH Interfaces

timeslots

Syntax	<code>timeslots <i>time-slot-range</i>;</code>
Hierarchy Level	[edit interfaces <i>e1-fpc/pic/port</i>], [edit interfaces <i>t1-fpc/pic/port</i>], [edit interfaces <i>interface-name</i> e1-options], [edit interfaces <i>interface-name</i> partition <i>partition-number</i>], [edit interfaces <i>interface-name</i> t1-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For E1 and T1 interfaces, allocate the specific time slots by number.



NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the `timeslots` statement must be included at the [edit interfaces *e1-fpc/pic/port*] or [edit interfaces *t1-fpc/pic/port*] hierarchy level as appropriate.

Options	<p><i>time-slot-range</i>—Actual time slot numbers allocated:</p> <p>Range: Ranges vary by interface type and configuration option as follows:</p> <ul style="list-style-type: none"> • 1 through 24 for T1 interfaces (0 is reserved) • 1 through 31 for 4-port E1 PICs (0 is reserved) • 1 through 31 for NxDS0 interfaces (0 is reserved) • 2 through 32 for 10-port Channelized E1 and 10-port Channelized E1 IQ PICs (1 is reserved) • 2 through 32 for the setting under e1-options with IQE PICs (1 is reserved) (when creating fractional E1) • 1 through 31 for the setting under partition with IQE PICs (0 is reserved) (when creating NxDS0)
----------------	--



NOTE: When creating fractional E1 interfaces only, if you connect a 4-port E1 PIC interface to a device that uses time slot numbering from 2 through 32, you must subtract 1 from the configured number of time slots.

Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Fractional E1 IQ and IQE Interfaces • Configuring Fractional T1 IQ and IQE Interfaces

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

tm

Syntax	tm (ignore normal require);
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options dce-options], [edit interfaces <i>interface-name</i> serial-options dte-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For EIA-530 interfaces only, configure the from-DCE signal, test-mode (TM).
Options	<p>ignore—The from-DCE signal is ignored.</p> <p>normal—Normal TM signal handling as defined by the TIA/EIA Standard 530.</p> <p>require—The from-DCE signal must be asserted.</p> <p>Default: normal</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring the Serial Signal Handling on page 281

tm-polarity

Syntax	tm-polarity (negative positive);
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure TM signal polarity.
Options	<p>negative—Negative signal polarity.</p> <p>positive—Positive signal polarity.</p> <p>Default: positive</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Serial Signal Polarities on page 284

traceoptions

See the following sections:

- **traceoptions (ICCP) on page 747**
- **traceoptions (Individual Interfaces) on page 748**
- **traceoptions (Interface Process) on page 750**
- **traceoptions (LACP) on page 752**
- **traceoptions (PPP Process) on page 754**
- **traceoptions (PPPoE) on page 757**



NOTE: For information about the traceoptions statement at the [edit protocols vrrp] hierarchy level, see the *Junos OS High Availability Configuration Guide*.

traceoptions (ICCP)

Syntax	<pre> traceoptions { local-ip-address <i>ip address</i>; session-establishment-hold-time <i>value</i>; authentication-key <i>string</i>; peer <i>ip-address</i> { local-ip-address <i>ip address</i>; session-establishment-hold-time <i>value</i>; authentication-key <i>string</i>; redundancy-group-id-list <i>redundancy-group-id-list</i>; liveness-detection; } } </pre>
Hierarchy Level	[edit protocols iccp]
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Define tracing operations for the ICCP protocol.
Default	If you do not include this statement, no ICCP protocol tracing operations are performed.
Options	<p>local-ip-address—Specify the source address where the ICCP packet is routed.</p> <p>session-establishment-hold-time—Specify if the chassis takes over as the master at the ICCP session.</p> <p>authentication-key—Specify TCP Message Digest 5 (MD5) option for an ICCP TCP session.</p> <p>redundancy-group-id-list—Specify the redundancy groups between two ICCP peers.</p> <p>liveness-detection—Specify Bidirectional Forwarding Detection (BFD) protocol options.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring ICCP for MC-LAG on page 187

traceoptions (Individual Interfaces)

Syntax	<pre>traceoptions { file <i>filename</i> <files <i>name</i>> <size <i>size</i>> <world-readable no-world-readable>; flag <i>flag</i>; match; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	<p>Define tracing operations for individual interfaces.</p> <p>To specify more than one tracing operation, include multiple flag statements.</p> <p>The interfaces traceoptions statement does not support a trace file. The logging is done by the kernel, so the tracing information is placed in the system syslog file in the directory /var/log.</p>
Default	If you do not include this statement, no interface-specific tracing operations are performed.
Options	<p>file <i>name</i>—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory /var/log. By default, interface process tracing output is placed in the file files <i>number</i>—(Optional) Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.dcd.</p> <p>match—(Optional) Regular expression for lines to be traced.</p> <p>no-world-readable—(Optional) Prevent any user from reading the log file.</p> <p>world-readable—(Optional) Allow any user to read the log file.</p> <p>size <i>size</i>—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named trace-file reaches this size, it is renamed trace-file.0. When the trace-file again reaches its maximum size, trace-file.0 is renamed trace-file.1 and trace-file is renamed trace-file.0. This renaming scheme continues until the maximum number of trace files is reached. Then, the oldest trace file is overwritten.</p> <p>flag—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements. The following are the interface-specific tracing options.</p> <ul style="list-style-type: none">• all—All interface tracing operations• event—Interface events• ipc—Interface interprocess communication (IPC) messages

- **media**—Interface media changes
- **q921**—Trace ISDN Q.921 frames
- **q931**—Trace ISDN Q.931 frames

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

Related Documentation • Tracing Operations of an Individual Router or Switch Interface on page 247

traceoptions (Interface Process)

Syntax	<pre>traceoptions { file <filename> <files number> <match regular-expression> <size size> <world-readable no-world-readable>; flag flag <disable>; no-remote-trace; }</pre>
Hierarchy Level	[edit interfaces]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Define tracing operations for the interface process (dcd).
Default	If you do not include this statement, no interface-specific tracing operations are performed.
Options	<p>disable—(Optional) Disable the tracing operation. You can use this option to disable a single operation when you have defined a broad group of tracing operations, such as all.</p> <p>filename—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory /var/log. By default, interface process tracing output is placed in the file dcd.</p> <p>files number—(Optional) Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.</p> <p>If you specify a maximum number of files, you also must specify a maximum file size with the size option.</p> <p>Range: 2 through 1000</p> <p>Default: 3 files</p> <p>flag—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements. You can include the following flags:</p> <ul style="list-style-type: none">• all• change-events—Log changes that produce configuration events• config-states—Log the configuration state machine changes• kernel—Log configuration IPC messages to kernel• kernel-detail—Log details of configuration messages to kernel <p>no-world-readable—(Optional) Disallow any user to read the log file.</p> <p>size size—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named trace-file reaches this size, it is renamed</p>

trace-file.0. When the ***trace-file*** again reaches its maximum size, ***trace-file.0*** is renamed ***trace-file.1*** and ***trace-file*** is renamed ***trace-file.0***. This renaming scheme continues until the maximum number of trace files is reached. Then, the oldest trace file is overwritten.

If you specify a maximum file size, you also must specify a maximum number of trace files with the **files** option.

Syntax: **xk** to specify kilobytes, **xm** to specify megabytes, or **xg** to specify gigabytes

Range: 10 KB through the maximum file size supported on your router

Default: 1 MB

world-readable—(Optional) Allow any user to read the log file.

match regex—(Optional) Refine the output to include only those lines that match the given regular expression.

Required Privilege Level	interface—To view this statement in the configuration.
	interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Tracing Operations of the Interface Process on page 248

traceoptions (LACP)

Syntax	<pre>traceoptions { file <filename> <files number> <size size> <world-readable no-world-readable>; flag flag; no-remote-trace; }</pre>
Hierarchy Level	[edit protocols lacp]
Release Information	Statement introduced in Junos OS Release 7.6.
Description	Define tracing operations for the LACP protocol.
Default	If you do not include this statement, no LACP protocol tracing operations are performed.
Options	<p>disable—(Optional) Disable the tracing operation. You can use this option to disable a single operation when you have defined a broad group of tracing operations, such as all.</p> <p>filename—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory /var/log. By default, interface process tracing output is placed in the file lacpd.</p> <p>files number—(Optional) Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.</p> <p>If you specify a maximum number of files, you also must specify a maximum file size with the size option.</p> <p>Range: 2 through 1000</p> <p>Default: 3 files</p> <p>flag—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements. You can include the following flags:</p> <ul style="list-style-type: none">• all—All LACP tracing operations• configuration—Configuration code• packet—Packets sent and received• process—LACP process events• protocol—LACP protocol state machine• routing-socket—Routing socket events• startup—Process startup events <p>no-world-readable—(Optional) Prevent any user from reading the log file.</p>

size size—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named **trace-file** reaches this size, it is renamed **trace-file.0**. When the **trace-file** again reaches its maximum size, **trace-file.0** is renamed **trace-file.1** and **trace-file** is renamed **trace-file.0**. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

If you specify a maximum file size, you also must specify a maximum number of trace files with the **files** option:

Syntax: **xk** to specify kilobytes, **xm** to specify megabytes, or **xg** to specify gigabytes

Range: 10 KB through the maximum file size supported on your router

Default: 1 MB

world-readable—(Optional) Allow any user to read the log file.

Required Privilege Level	interface—To view this statement in the configuration.
	interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Tracing LACP Operations

traceoptions (PPP Process)

Syntax	<pre>traceoptions { file <i>filename</i> <files <i>number</i>> <match <i>regular-expression</i>> <size <i>size</i>> <world-readable no-world-readable>; flag <i>flag</i>; level <i>severity-level</i>; no-remote-trace; }</pre>
Hierarchy Level	[edit protocols ppp]
Release Information	Statement introduced in Junos OS Release 7.5.
Description	<p>Define tracing operations for the PPP process.</p> <p>To specify more than one tracing operation, include multiple flag statements.</p> <p>You cannot specify a separate trace tile. Tracing information is placed in the system syslog file in the directory /var/log/pppd.</p>
Default	If you do not include this statement, no PPPD-specific tracing operations are performed.
Options	<p>filename—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory /var/log. By default, commit script process tracing output is placed in the file ppd. If you include the file statement, you must specify a filename. To retain the default, you can specify eventd as the filename.</p> <p>files <i>number</i>—(Optional) Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.</p> <p>If you specify a maximum number of files, you also must specify a maximum file size with the size option and a filename.</p> <p>Range: 2 through 1000</p> <p>Default: 3 files</p> <p>disable—(Optional) Disable the tracing operation. You can use this option to disable a single operation when you have defined a broad group of tracing operations, such as all.</p> <p>flag—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements. The following are the PPPD-specific tracing options.</p> <ul style="list-style-type: none">• access—Access code• address-pool—Address pool code• all—All areas of code• auth—Authentication code

- **chap**—Challenge Handshake Authentication Protocol (CHAP) code
- **config**—Configuration code
- **ifdb**—Interface database code
- **lcp**—LCP state machine code
- **memory**—Memory management code
- **message**—Message processing code
- **mlppp**—Trace MLPPP code
- **ncp**—NCP state machine code
- **pap**—Password Authentication Protocol (PAP) code
- **ppp**—PPP protocol processing code
- **radius**—RADIUS processing code
- **rtsock**—Routing socket code
- **session**—Session management code
- **signal**—Signal handling code
- **timer**—Timer code
- **ui**—User interface code

match *regex*—(Optional) Refine the output to include only those lines that match the given regular expression.

size *size*—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named ***trace-file*** reaches this size, it is renamed ***trace-file.0***. When the ***trace-file*** again reaches its maximum size, ***trace-file.0*** is renamed ***trace-file.1*** and ***trace-file*** is renamed ***trace-file.0***. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

If you specify a maximum file size, you also must specify a maximum number of trace files with the **files** option and filename.

Syntax: *xk* to specify KB, *xm* to specify MB, or *xg* to specify GB

Range: 10 KB through 1 GB

Default: 128 KB

world-readable—(Optional) Enable unrestricted file access.

non-world-readable—(Optional) By default, log files can be accessed only by the user who configures the tracing operation. Specify **non-world-readable** to reset the default.

Required Privilege	interface—To view this statement in the configuration.
Level	interface-control—To add this statement to the configuration.

- Related Documentation**
- [Tracing Operations of the pppd Process on page 128](#)

traceoptions (PPPoE)

Syntax	<pre> traceoptions { file <filename> <files number> <match regular-expression> <size maximum-file-size> <world-readable no-world-readable>; flag flag; level (all error info notice verbose warning); no-remote-trace; } </pre>
Hierarchy Level	[edit protocols pppoe]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Define tracing operations for PPPoE processes.
Options	<p>file filename—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory /var/log.</p> <p>files number—(Optional) Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and finally trace-file.2, until the maximum number of trace files is reached. Then the oldest trace file is overwritten. If you specify a maximum number of files, you also must specify a maximum file size with the size option.</p> <p>Range: 2 through 1000</p> <p>Default: 3 files</p> <p>flag flag—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements. You can include the following flags:</p> <ul style="list-style-type: none"> • all—Trace all operations. • config—Trace configuration events. • events—Trace events. • gres—Trace GRES events. • init—Trace initialization events. • interface-db—Trace interface database operations. • memory—Trace memory processing events. • protocol—Trace protocol events. • rtsock—Trace routing socket events. • session-db—Trace connection events and flow. • signal—Trace signal operations. • state—Trace state handling events. • timer—Trace timer processing. • ui—Trace user interface processing.

level—Level of tracing to perform. You can specify any of the following levels:

- **all**—Match all levels.
- **error**—Match error conditions.
- **info**—Match informational messages.
- **notice**—Match notice messages about conditions requiring special handling.
- **verbose**—Match verbose messages.
- **warning**—Match verbose messages.

disable—Disable this trace flag.

match *regular-expression*—(Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace—Disable remote tracing.

no-world-readable—(Optional) Disable unrestricted file access.

size *maximum-file-size*—(Optional) Maximum size of each trace file. By default, the number entered is treated as bytes. Alternatively, you can include a suffix to the number to indicate kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you also must specify a maximum number of trace files with the **files** option.

Syntax: *sizek* to specify KB, *sizem* to specify MB, or *sizeg* to specify GB

Range: 10240 through 1073741824

Default: 128 KB

world-readable—(Optional) Enable unrestricted file access.

Required Privilege Level	trace —To view this statement in the configuration.
	trace-control —To add this statement to the configuration.
Related Documentation	• Configuring PPPoE Service Name Tables
	• Tracing PPPoE Operations

translate-discard-eligible

Syntax	(translate-discard-eligible no-translate-discard-eligible);
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family ccc], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family ccc]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For interfaces with encapsulation type Frame Relay CCC, enable or disable translation of Frame Relay discard eligible (DE) control bits.
Default	DE bit translation is disabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Frame Relay Control Bit Translation

translate-fecn-and-becn

Syntax	(translate-fecn-and-becn no-translate-fecn-and-becn);
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family ccc], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family ccc]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For interfaces with encapsulation type Frame Relay CCC, enable or disable translation of Frame Relay forward explicit congestion notification (FECN) control bits and Frame Relay backward explicit congestion notification (BECN) control bits.
Default	FECN and BECN bit translation is disabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Frame Relay Control Bit Translation

transmit-bucket

Syntax	<pre>transmit-bucket { overflow discard; rate <i>percentage</i>; threshold <i>bytes</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Set parameters for the transmit leaky bucket, which specifies what percentage of the interface's total capacity can be used to transmit packets.</p> <p>For each DS3 channel in a channelized OC12 interface, you can configure a unique transmit bucket.</p> <p>The statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Receive and Transmit Leaky Bucket Properties on page 138Configuring Receive and Transmit Leaky Bucket Properties on SONET/SDH Interfacesreceive-bucket on page 670

transmit-clock

Syntax	<pre>transmit-clock invert;</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> serial-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the transmit clock signal.
Options	invert —Shift the clock phase 180 degrees.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the Serial Clocking Mode on page 279

transmit-period

Syntax	<code>transmit-period <i>seconds</i>;</code>
Hierarchy Level	[edit protocols dot1x authenticator interface <i>interface-id</i>]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Set the number of seconds the port waits before retransmitting the initial EAPOL PDUs to the client.
Options	<p><i>seconds</i>—The number of seconds the port waits before retransmitting the initial EAPOL PDUs to the client.</p> <p>Range: 1 through 65,535 seconds</p> <p>Default: 30 seconds</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• IEEE 802.1x Port-Based Network Access Control Overview• authenticator on page 326• dot1x on page 405• interface (IEEE 802.1x) on page 495

transmit-weight

See the following sections:

- **transmit-weight (ATM2 IQ CoS Forwarding Class)** on page 762
- **transmit-weight (ATM2 IQ Virtual Circuit)** on page 763

transmit-weight (ATM2 IQ CoS Forwarding Class)

Syntax	transmit-weight (cells <i>number</i> percent <i>number</i>);
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options scheduler-maps <i>map-name</i> forwarding-class <i>class-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, assign a transmission weight to a forwarding class.
Default	95 percent for queue 0, 5 percent for queue 3.
Options	percent <i>percent</i> —Transmission weight of the forwarding class as a percentage of the total bandwidth. Range: 5 through 100 cells <i>number</i> —Transmission weight of the forwarding class as a number of cells. Range: 0 through 32,000
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring ATM2 IQ VC Tunnel CoS Components

transmit-weight (ATM2 IQ Virtual Circuit)

Syntax	<code>transmit-weight <i>number</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ PICs only, configure the transmission weight. Each VC is serviced in weighted round robin (WRR) mode. When VCs have data to send, they send the number of cells equal to their weight before passing control to the next active VC. This allows proportional bandwidth sharing between multiple VCs within a rate-shaped VP tunnel. VP tunnels are not supported on multipoint interfaces.
Options	<i>number</i> —Number of cells a VC sends before passing control to the next active VC within a VP tunnel. Range: 1 through 32,767
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring the ATM2 IQ Transmission Weight

traps

Syntax	<code>(traps no-traps);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit interfaces interface-range <i>name</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Enable or disable the sending of Simple Network Management Protocol (SNMP) notifications when the state of the connection changes.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Enabling or Disabling SNMP Notifications on Physical Interfaces on page 148 Enabling or Disabling SNMP Notifications on Logical Interfaces on page 167

trigger

Syntax	<pre>trigger { defect ignore; defect hold-time up milliseconds down milliseconds; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM over SONET/SDH, SONET/SDH interfaces, and 10-Gigabit Ethernet interfaces in WAN PHY mode, configure SONET/SDH defect triggers to be ignored.
Default	If you do not include this statement, all SONET/SDH defect triggers are honored.
Options	<p>defect—Defect to ignore or hold. It can be one of the following:</p> <ul style="list-style-type: none">• ais-l—Line alarm indication signal• ais-p—Path alarm indication signal• ber-sd—Bit error rate signal degrade• ber-sf—Bit error rate signal fault• locd (ATM only)—Loss of cell delineation• lof—Loss of frame• lol—PHY loss of light• lop-p—Path loss of pointer• los—Loss of signal• pll—PHY phase-locked loop out of lock• plm-p—Path payload label mismatch• rfi-l—Line remote failure indication• rfi-p—Path remote failure indication• uneq-p—Path unequipped <p>The remaining statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring SONET/SDH Defect Triggers to Be Ignored

trigger-link-failure

Syntax	[trigger-link-failure <i>interface-name</i>];
Hierarchy Level	[edit interfaces <i>lsq-fpc/pic/port</i> lsq-failure-options]
Release Information	Statement introduced in Junos OS Release 7.4.
Description	List of SONET interfaces connected to the LSQ interface that can implement Automatic Protection Switching (APS) if the LSQ PIC fails.
Options	<i>interface-name</i> —Name of SONET interface.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Junos OS Services Interfaces Configuration Guide

trunk-bandwidth

Syntax	trunk-bandwidth <i>rate</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM2 IQ interfaces configured to use Layer 2 circuit trunk mode, configure a scheduler so that unused bandwidth from any inactive trunk is proportionally shared among the active trunks.</p> <p>During congestion, each trunk receives a proportional share of the leftover bandwidth, thus minimizing the latency on each trunk.</p>
Options	<p><i>rate</i>—Peak rate, in bits per second (bps) or cells per second (cps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000). You can also specify a value in cells per second by entering a decimal number followed by the abbreviation c; values expressed in cells per second are converted to bits per second by means of the formula 1 cps = 384 bps.</p> <p>Range: 1,000,000 through 542,526,792 bps</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Layer 2 Circuit Trunk Mode Scheduling

trunk-id

Syntax	<code>trunk-id <i>number</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM2 IQ interfaces with ATM CCC cell-relay encapsulation, configure the trunk identification number.</p> <p>When you associate a trunk ID number with a logical interface, you are in effect specifying the interfaces that are allowed to send ATM traffic over an LSP.</p>
Options	<p><i>number</i>—A valid trunk identifier.</p> <p>Range: For UNI mode, 0 through 7. For NNI mode, 0 through 31.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">Configuring Layer 2 Circuit Transport Mode


ttl

Syntax	<code>ttl <i>value</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>number</i> tunnel]
Release Information	Statement introduced before Junos OS Release 7.4
Description	Set the time-to-live value bit in the header of the outer IP packet.
Options	<p><i>value</i>—Time-to-live value.</p> <p>Range: 0 through 255</p> <p>Default: 64</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">Junos OS Services Interfaces Configuration Guide

tunnel

Syntax	<pre> tunnel { backup-destination <i>address</i>; destination <i>address</i>; key <i>number</i>; routing-instance { destination <i>routing-instance-name</i>; } source <i>source-address</i>; ttl <i>number</i>; } </pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure a tunnel. You can use the tunnel for unicast and multicast traffic or just for multicast traffic. You can also use tunnels for encrypted traffic or VPNs.</p> <p>The statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Junos OS Services Interfaces Configuration Guide • Junos OS VPNs Configuration Guide

underlying-interface

Syntax	<code>underlying-interface <i>interface-name</i>;</code>
Hierarchy Level	<p>[edit interfaces pp0 unit <i>logical-unit-number</i> pppoe-options],</p> <p>[edit interfaces demux0 unit <i>logical-unit-number</i> demux-options],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces demux0 unit <i>logical-unit-number</i> demux-options],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces pp0 unit <i>logical-unit-number</i> pppoe-options],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> interfaces demux0 unit <i>logical-unit-number</i> demux-options]</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> interfaces pp0 unit <i>logical-unit-number</i> pppoe-options],</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Support for aggregated Ethernet added in Junos OS Release 9.4.</p>
Description	<p>For J Series Services Routers, M120 and M320 Multiservice Edge routers, and MX Series Universal Edge Routers with PPP over Ethernet interfaces, configure the interface on which PPP over Ethernet is running.</p> <p>For demux interfaces, configure the underlying interface on which the demultiplexing (demux) interface is running.</p>
Options	<p><i>interface-name</i>—Name of the interface on which PPP over Ethernet or demux is running. For example, at-0/0/1.0 (ATM VC), fe-1/0/1.0 (Fast Ethernet interface), ge-2/0/0.0 (Gigabit Ethernet interface), ae1.0 (for IP demux on an aggregated Ethernet interface), or ae1 (for VLAN demux on an aggregated Ethernet interface).</p>
<div style="display: flex; align-items: center;">  <div> <p>NOTE: Demux interfaces are currently supported on Gigabit Ethernet, Fast Ethernet, 10-Gigabit Ethernet interfaces, or aggregated Ethernet devices.</p> </div> </div>	
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring an IP Demux Underlying Interface on page 259 Configuring a VLAN Demux Underlying Interface on page 261 Specifying the Demux Underlying Interface on page 261 Configuring the PPPoE Underlying Interface <i>Junos OS Interfaces and Routing Configuration Guide</i>

unframed

Syntax	(unframed no-unframed);
Hierarchy Level	[edit interfaces <i>interface-name</i> e3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For E3 IQ interfaces only, enable or disable unframed mode. In unframed mode, the E3 IQ interface do not detect yellow (ylw) or loss-of-frame (lof) alarms.
Default	Unframed mode is disabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring E3 IQ and IQE Unframed Mode

unidirectional

Syntax	unidirectional;
Hierarchy Level	[edit interfaces <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	<p>Create two new, unidirectional (transmit-only and receive-only) physical interfaces subordinate to the original parent interface. Unidirectional links are currently supported only on 10-Gigabit Ethernet interfaces on the following hardware:</p> <ul style="list-style-type: none"> 4-port 10-Gigabit Ethernet DPC on the MX960 router 10-Gigabit Ethernet IQ2 PIC and 10-Gigabit Ethernet IQ2E PIC on the T Series router
Default	Disabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Enabling Unidirectional Traffic Flow on Physical Interfaces on page 148

unit

```
Syntax  unit logical-unit-number {
    accept-source-mac {
        mac-address mac-address {
            policer {
                input cos-policer-name;
                output cos-policer-name;
            }
        }
    }
    accounting-profile name;
    allow-any-vci;
    atm-scheduler-map (map-name | default);
    backup-options {
        interface interface-name;
    }
    bandwidth rate;
    cell-bundle-size cells;
    clear-dont-fragment-bit;
    compression {
        rtp {
            maximum-contexts number <force>;
            f-max-period number;
            queues [ queue-numbers ];
            port {
                minimum port-number;
                maximum port-number;
            }
        }
    }
    compression-device interface-name;
    copy-tos-to-outer-ip-header;
    demux-destination family;
    demux-source family;
    demux-options {
        underlying-interface interface-name;
    }
    description text;
    dial-options {
        l2tp-interface-id name;
        (dedicated | shared);
    }
    dialer-options {
        activation-delay seconds;
        callback;
        callback-wait-period time;
        deactivation-delay seconds;
        dial-string [ dial-string-numbers ];
        idle-timeout seconds;
        incoming-map {
            caller caller-id | accept-all;
            initial-route-check seconds;
            load-interval seconds;
        }
    }
}
```



```

    load-threshold percent;
    pool pool-name;
    redial-delay time;
    watch-list {
        [ routes ];
    }
}
disable;
disable-mlppp-inner-ppp-pfc;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
    activation-priority priority;
    bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
family family-name {
    ... the family subhierarchy appears after the main [edit interfaces interface-name unit
        logical-unit-number] hierarchy ...
}
fragment-threshold bytes;
inner-vlan-id-range start start-id end end-id;
input-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap |
    swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
    output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
    up-count cells;
    down-count cells;
}
oam-period (disable | seconds);
output-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap |
    swap-push | swap-swap);
    inner-tag-protocol-id tpid;

```

```
    inner-vlan-id number;  
    tag-protocol-id tpid;  
    vlan-id number;  
  }  
  passive-monitor-mode;  
  peer-unit unit-number;  
  plp-to-clp;  
  point-to-point;  
  ppp-options {  
    chap {  
      access-profile name;  
      default-chap-secret name;  
      local-name name;  
      passive;  
    }  
    compression {  
      acfc;  
      pfc;  
    }  
    dynamic-profile profile-name;  
    lcp-restart-timer milliseconds;  
    loopback-clear-timer seconds;  
    ncp-restart-timer milliseconds;  
    pap {  
      access-profile name;  
      default-pap-password password;  
      local-name name;  
      local-password password;  
      passive;  
    }  
  }  
  pppoe-options {  
    access-concentrator name;  
    auto-reconnect seconds;  
    (client | server);  
    service-name name;  
    underlying-interface interface-name;  
  }  
  pppoe-underlying-options {  
    access-concentrator name;  
    dynamic-profile profile-name;  
    max-sessions number;  
  }  
  proxy-arp;  
  service-domain (inside | outside);  
  shaping {  
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst  
      length);  
    queue-length number;  
  }  
  short-sequence;  
  targeted-distribution;  
  transmit-weight number;  
  (traps | no-traps);  
  trunk-bandwidth rate;  
  trunk-id number;
```

```

tunnel {
    backup-destination address;
    destination address;
    key number;
    routing-instance {
        destination routing-instance-name;
    }
    source source-address;
    ttl number;
}
vci vpi-identifier.vci-identifier;
vci-range start start-vci end end-vci;
vpi vpi-identifier;
vlan-id number;
vlan-id-range number-number;
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
family family {
    accounting {
        destination-class-usage;
        source-class-usage {
            (input | output | input output);
        }
    }
    access-concentrator name;
    address address {
        ... the address subhierarchy appears after the main [edit interfaces interface-name unit
            logical-unit-number family family-name] hierarchy ...
    }
    bridge-domain-type (bvlan | svlan);
    bundle interface-name;
    core-facing;
    demux-destination {
        destination-prefix;
    }
    demux-source {
        source-prefix;
    }
    duplicate-protection;
    dynamic-profile profile-name;
    filter {
        group filter-group-number;
        input filter-name;
        input-list [ filter-names ];
        output filter-name;
        output-list [ filter-names ];
    }
    interface-mode (access | trunk);
    ipsec-sa sa-name;
    isid-list all-service-groups;
    keep-address-and-control;
    mac-validate (loose | strict);
    max-sessions number;
    mtu bytes;
    multicast-only;
    no-redirects;
    policer {

```

```
    arp policer-template-name;  
    input policer-template-name;  
    output policer-template-name;  
  }  
  primary;  
  protocols [inet iso mpls];  
  proxy inet-address address;  
  receive-options-packets;  
  receive-ttl-exceeded;  
  remote (inet-address address | mac-address address);  
  rpf-check {  
    fail-filter filter-name  
    mode loose;  
  }  
  sampling {  
    input;  
    output;  
  }  
  service {  
    input {  
      post-service-filter filter-name;  
      service-set service-set-name <service-filter filter-name>;  
    }  
    output {  
      service-set service-set-name <service-filter filter-name>;  
    }  
  }  
  service-name-table table-name  
  (translate-discard-eligible | no-translate-discard-eligible);  
  (translate-fecn-and-becn | no-translate-fecn-and-becn);  
  unnumbered-address interface-name destination address  
    destination-profile profile-name;  
  vlan-id number;  
  vlan-id-list [number number-number];  
  address address {  
    arp ip-address (mac | multicast-mac) mac-address <publish>;  
    broadcast address;  
    destination address;  
    destination-profile name;  
    eui-64;  
    master-only;  
    multipoint-destination address {  
      dlci dlci-identifier;  
      epd-threshold cells <plp1 cells>;  
      inverse-arp;  
      oam-liveness {  
        up-count cells;  
        down-count cells;  
      }  
      oam-period (disable | seconds);  
    }  
    shaping {  
      (cbr rate | rtvbr burst length peak rate sustained rate | vbr burst length peak rate  
        sustained rate);  
      queue-length number;  
    }  
    vci vpi-identifier.vci-identifier;
```

```

}
preferred;
primary;
(vrrp-group | vrrp-inet6-group) group-number {
  (accept-data | no-accept-data);
  advertise-interval seconds;
  authentication-type authentication;
  authentication-key key;
  fast-interval milliseconds;
  (preempt | no-preempt) {
    hold-time seconds;
  }
  priority number;
  track {
    interface interface-name {
      bandwidth-threshold bits-per-second priority-cost number;
    }
    priority-hold-time seconds;
    route ip-address/prefix-length routing-instance instance-name priority-cost cost;
  }
  virtual-address [ addresses ];
  virtual-link-local-address ipv6-address;
  vrrp-inherit-from {
    active-interface interface-name;
    active-group group-number;
  }
}
}
}
}

```

Hierarchy Level	[edit interfaces <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i>], [edit interfaces <i>interface-set</i> <i>interface-set-name</i> interface <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure a logical interface on the physical device. You must configure a logical interface to be able to use the physical device.
Options	<p><i>logical-unit-number</i>—Number of the logical unit.</p> <p>Range: 0 through 1,073,741,823 for demux and PPPoE static interfaces only. 0 through 16,385 for all other static interface types.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>

**Related
Documentation**

- Configuring Logical Interface Properties
- Example: Configuring E-LINE and E-LAN Services for a PBB Network on MX Series Routers
- [*Junos OS Services Interfaces Configuration Guide*](#)

unnumbered-address

See the following sections:

- **unnumbered-address (Demux) on page 777**
- **unnumbered-address (Ethernet) on page 778**
- **unnumbered-address (PPP) on page 779**

unnumbered-address (Demux)

Syntax	<code>unnumbered-address interface-name <preferred-source-address address>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet]
Release Information	Statement introduced in Junos OS Release 8.2. preferred-source-address option introduced in Junos OS Release 9.0. IP demultiplexing interfaces supported in Junos OS Release 9.2.
Description	For IP demultiplexing interfaces, enable the local address to be derived from the specified interface. Configuring an unnumbered interface enables IP processing on the interface without assigning an explicit IP address to the interface.
Options	interface-name —Name of the interface from which the local address is derived. The specified interface must have a logical unit number and a configured IP address, and must not be an unnumbered interface. The preferred-source-address statement is explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring an Unnumbered Interface on page 190 • address on page 306 • <i>Junos System Basics Configuration Guide</i>

unnumbered-address (Ethernet)

Syntax	<code>unnumbered-address interface-name <preferred-source-address address>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>]
Release Information	Statement introduced in Junos OS Release 8.2. preferred-source-address option introduced in Junos OS Release 9.0.
Description	For Ethernet interfaces, enable the local address to be derived from the specified interface. Configuring an unnumbered Ethernet interface enables IP processing on the interface without assigning an explicit IP address to the interface.
Options	interface-name —Name of the interface from which the local address is derived. The specified interface must have a logical unit number and a configured IP address, and must not be an unnumbered interface. The preferred-source-address statement is explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring an Unnumbered Interface on page 190address on page 306<i>Junos System Basics Configuration Guide</i>

unnumbered-address (PPP)

Syntax	<code>unnumbered-address interface-name destination address destination-profile profile-name;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For interfaces with PPP encapsulation, enable the local address to be derived from the specified interface.
Options	<i>interface-name</i> —Interface from which the local address is derived. The interface name must include a logical unit number and must have a configured address. The remaining statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring IPCP Options on page 187• address on page 306• negotiate-address on page 590• Junos OS System Basics Configuration Guide

up-count

Syntax	<code>up-count <i>cells</i>;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i> oam-liveness],</code> <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> oam-liveness],</code> <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i></code> <code> multipoint-destination <i>address</i> oam-liveness],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i></code> <code> oam-liveness],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i></code> <code> family <i>family</i> address <i>address</i> multipoint-destination <i>address</i> oam-liveness]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM encapsulation only, configure Operation, Administration, and Maintenance (OAM) F5 loopback cell count thresholds. Not supported on ATM-over-SHDSL interfaces.</p> <p>For ATM2 IQ PICs only, configure OAM F4 loopback cell count thresholds at the [edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i>] hierarchy level.</p>
Options	<p>cells—Minimum number of consecutive OAM F4 or F5 loopback cells received before a VC is declared up.</p> <p>Range: 1 through 255</p> <p>Default: 5 cells</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">Configuring the ATM OAM F5 Loopback Cell Threshold

user-prefix

Syntax	<code>user-prefix <i>user-prefix-string</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> auto-configure vlan-ranges authentication username-include], [edit interfaces <i>interface-name</i> auto-configure stacked-vlan-ranges authentication username-include]
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Specify the user prefix that is concatenated with the username during the subscriber authentication process.
Options	<i>user-prefix-string</i> —The user prefix string.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring VLAN Interface Username Information for AAA Authentication

username-include

Syntax	<pre>username-include { circuit-type; delimiter <i>delimiter-character</i>; domain-name <i>domain-name-string</i>; interface-name; mac-address; option-82; radius-realm <i>radius-realm-string</i>; user-prefix <i>user-prefix-string</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> auto-configure vlan-ranges authentication], [edit interfaces <i>interface-name</i> auto-configure stacked-vlan-ranges authentication]
Release Information	Statement introduced in Junos OS Release 10.0.
Description	<p>Configure the username that the router passes to the external AAA server. You must include at least one of the optional statements for the username to be valid. If you do not configure a username, the router accesses the local authentication service only and does not use external authentication services, such as RADIUS.</p> <p>The username takes the format <user-prefix> <mac-address> <circuit-type> <option-82> <interface-name> <domain-name> <radius-realm> with each component separated by whatever delimiter you choose.</p> <p>The statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring VLAN Interface Username Information for AAA Authentication

vbr

Syntax	<code>vbr peak rate sustained rate burst length;</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i> shaping], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> shaping], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> shaping]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p>
Description	<p>For ATM encapsulation only, define the variable bandwidth utilization in the traffic-shaping profile.</p> <p>When you configure the variable bandwidth utilization, you must specify all three options (burst, peak, and sustained). You can specify the rate in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000). You can also specify the rate in cells per second by entering a decimal number followed by the abbreviation c; values expressed in cells per second are converted to bits per second by means of the formula 1 cps = 384 bps.</p>
Default	If the vbr statement is not specified, bandwidth utilization is unlimited.
Options	<p>burst length—Burst length, in cells. If you set the length to 1, the peak traffic rate is used. Range: 1 through 4000 cells</p> <p>peak rate—Peak rate, in bits per second or cells per second. Range: For ATM1 interfaces, 33 Kbps through 135.6 Mbps (ATM OC3); 33 Kbps through 276 Mbps (ATM OC12). For ATM2 IQ OC3 and OC12 interfaces, 33 Kbps through 542,526,792 bps. For ATM2 IQ OC48 interfaces, 33 Kbps through 2,170,107,168 bps. For ATM2 IQ DS3 and E3 interfaces, from 33 Kbps through the maximum rate, which depends on the ATM encapsulation and framing you configure.</p> <p>sustained rate—Sustained rate, in bits per second or cells per second. Range: For ATM1 interfaces, 33 Kbps through 135.6 Mbps (ATM OC3); 33 Kbps through 276 Mbps (ATM OC12). For ATM2 IQ OC3 and OC12 interfaces, 33 Kbps through 542,526,792 bps. For ATM2 IQ OC48 interfaces, 33 Kbps through 2,170,107,168 bps. For ATM2 IQ DS3 and E3 interfaces, from 33 Kbps through the maximum rate, which depends on the ATM encapsulation and framing you configure.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>

- Related Documentation**
- [Configuring ATM CBR](#)
 - [cbr on page 353](#)
 - [rtvbr on page 686](#)
 - [shaping on page 703](#)

vc-cos-mode

Syntax	vc-cos-mode (alternate strict);
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options scheduler-maps <i>map-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, specify packet-scheduling priority value for ATM2 IQ VC tunnels.
Options	<p>alternate—VC CoS queue has high priority. The scheduling of the queues alternates between the high-priority queue and the remaining queues, so every other scheduled packet is from the high-priority queue.</p> <p>strict—VC CoS queue has strictly high priority. A queue with strict high priority is always scheduled before the remaining queues. The remaining queues are scheduled in round-robin fashion.</p> <p>Default: alternate</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring ATM2 IQ VC Tunnel CoS Components

vci

Syntax	<code>vci vpi-identifier.vci-identifier;</code>
Hierarchy Level	<p>[edit interfaces at-<i>fpc/pic/port</i> unit <i>logical-unit-number</i>],</p> <p>[edit interfaces at-<i>fpc/pic/port</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i> multipoint-destination <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces at-<i>fpc/pic/port</i> unit <i>logical-unit-number</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces at-<i>fpc/pic/port</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i> multipoint-destination <i>address</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p>
Description	<p>For ATM point-to-point logical interfaces only, configure the virtual circuit identifier (VCI) and virtual path identifier (VPI).</p> <p>To configure a VPI for a point-to-multipoint interface, specify the VPI in the multipoint-destination statement.</p> <p>VCIs 0 through 31 are reserved for specific ATM values designated by the ATM Forum.</p>
Options	<p>vci-identifier—ATM virtual circuit identifier. Unless you configure the interface to use promiscuous mode, this value cannot exceed the highest-numbered VC configured for the interface with the maximum-vcs option of the vpi statement.</p> <p>Range: 0 through 4089 or 0 through 65,535 with promiscuous mode, with VCIs 0 through 31 reserved.</p> <p>vpi-identifier—ATM virtual path identifier.</p> <p>Range: 0 through 255</p> <p>Default: 0</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring a Point-to-Point ATM1 or ATM2 IQ Connection multipoint-destination on page 582 promiscuous-mode on page 657 vpi (ATM CCC Cell-Relay Promiscuous Mode) on page 803

vci-range

Syntax	<code>vci-range start <i>start-vci</i> end <i>end-vci</i>;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 9.0.
Description	Range of VCI values used in ATM-to-Ethernet interworking cross-connects. VCI 0 through 31 are reserved. VCI 0 through 31 should not be used.
Options	start-vci —Lowest number VCI in the range. end-vci —Highest number VCI in the range. Range: 0 through 255
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ATM-to-Ethernet Interworking on page 236

virtual-switch

Syntax	<code>virtual-switch <i>name</i> bridge-domain <i>name</i> vlan-id [<i>vlan-ids</i>];</code>
Hierarchy Level	[edit protocols oam ethernet connectivity-fault-management maintenance-domain <i>domain-name</i> default-x]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Specify the routing-instance type as a virtual switch, under which bridge-domain MIPs must be enabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring MIP for Bridge Domains of a Virtual SwitchExample: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers

vlan-id

See the following sections:

- [vlan-id \(Logical Port in Bridge Domain\) on page 787](#)
- [vlan-id \(Outer VLAN ID\) on page 788](#)
- [vlan-id \(VLAN ID to Be Bound to a Logical Interface\) on page 788](#)
- [vlan-id \(VLAN ID to Rewrite\) on page 789](#)

vlan-id (Logical Port in Bridge Domain)

Syntax	<code>vlan-id <i>number</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family bridge], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family bridge]
Release Information	Statement introduced in Junos OS Release 9.2.
Description	The VLAN ID configured on the logical port. Received packets with no VLAN tags are forwarded within the bridge domain with the matching VLAN ID.
Options	number —The VLAN ID. Range: 1 through 4095
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring a Logical Interface for Access Mode

vlan-id (Outer VLAN ID)

Syntax	<code>vlan-id <i>outer-vlan-id</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 9.0.
Description	The outer VLAN ID to be used in ATM-to-Ethernet interworking cross-connects. Outer VLAN IDs are converted to the ATM VPI. The outer VLAN ID must match the VPI value configured. The allowable VPI range is 0 to 255. Do not configure the outer VLAN ID to be greater than 255.
Options	outer-vlan-id —Outer VLAN ID number. Range: 0 through 4094
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ATM-to-Ethernet Interworking on page 236

vlan-id (VLAN ID to Be Bound to a Logical Interface)

Syntax	<code>vlan-id <i>number</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Fast Ethernet, Gigabit Ethernet, and Aggregated Ethernet interfaces only, bind a 802.1Q VLAN tag ID to a logical interface.
Options	number —A valid VLAN identifier. Range: For aggregated Ethernet, 4-port, 8-port, and 12-port Fast Ethernet PICs, and for management and internal Ethernet interfaces, 1 through 1023. For 48-port Fast Ethernet and Gigabit Ethernet PICs, 1 through 4094. VLAN ID 0 is reserved for tagging the priority of frames.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Mixed Tagging

vlan-id (VLAN ID to Rewrite)

Syntax	<code>vlan-id <i>number</i>;</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map]</p>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For Gigabit Ethernet IQ and 10-Gigabit Ethernet IQ2, 10-Gigabit Ethernet LAN/WAN PIC, and IQ2-E interfaces and aggregated Ethernet using Gigabit Ethernet IQ interfaces, specify the line VLAN identifiers to be rewritten at the input or output interface.</p> <p>You cannot include the vlan-id statement with the swap statement, swap-push statement, push-push statement, or push-swap statement at the [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map] hierarchy level. If you include any of those statements in the output VLAN map, the VLAN ID in the outgoing frame is rewritten to the vlan-id statement that you include at the [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>] hierarchy level.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Rewriting the VLAN Tag on Tagged Frames • Binding VLAN IDs to Logical Interfaces

vlan-id-list

See the following sections:

- **vlan-id-list (Ethernet VLAN Circuit) on page 791**
- **vlan-id-list (Interface in Bridge Domain) on page 792**

vlan-id-list (Ethernet VLAN Circuit)

Syntax	<code>vlan-id-list [<i>vlan-id</i> <i>vlan-id</i>–<i>vlan-id</i>];</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]</code>
Release Information	Statement introduced in Junos OS Release 9.5.
Description	(MX Series routers only) Binds a single-tag logical interface to a list of VLAN IDs. Configures a logical interface to receive and forward any tag frame whose VLAN ID tag matches the list of VLAN IDs you specify.



NOTE:

When you create a circuit cross-connect (CCC) using VLAN-bundled single-tag logical interfaces on Layer 2 VPN routing instances, the circuit automatically uses ethernet encapsulation. For Layer 2 VPN, you need to include the `encapsulation-type` statement and specify the value `ethernet` at either of the following hierarchy levels:

- `[edit routing-instances routing-instance-name protocols l2vpn]`
- `[edit logical-systems logical-system-name routing-instances routing-instance-name protocols l2vpn]`

For more information about the `encapsulation-type` configuration statement and the Layer 2 encapsulation types `ethernet` and `ethernet-vlan`, see the [Junos OS VPNs Configuration Guide](#).

Options `[vlan-id vlan-id–vlan-id]`—A list of valid VLAN ID numbers. Specify the VLAN IDs individually by using a space to separate each ID, as an inclusive list by separating the starting VLAN ID and ending VLAN ID with a hyphen, or as a combination of both.

Range: 1 through 4094. VLAN ID 0 is reserved for tagging the priority of frames.



NOTE: Configuring `vlan-id-list` with the entire `vlan-id` range is an unnecessary waste of system resources and is not best practice. It should be used only when a subset of VLAN IDs (not the entire range) needs to be associated with a logical interface. If you specify the entire range (1-4094), it has the same result as not specifying a range; however, it consumes PFE resources such as VLAN lookup tables entries, and so on.

The following examples illustrate this further:

```
[edit interfaces interface-name
vlan-tagging;
unit number {
    vlan-id-range 1-4094;
}
```

```
[edit interfaces interface-name]  
unit 0;
```

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Binding VLAN IDs to Logical Interfaces
- [encapsulation \(Logical Interface\) on page 421](#)
- [encapsulation \(Physical Interface\) on page 424](#)
- encapsulation-type (Layer 2 VPN routing instance), see the [Junos OS VPNs Configuration Guide](#)
- [flexible-vlan-tagging on page 449](#)
- [vlan-tagging on page 797](#)
- [vlan-tags \(Dual-Tagged Logical Interface\) on page 799](#)

vlan-id-list (Interface in Bridge Domain)

Syntax `vlan-id-list [number number-number];`

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number* family bridge],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family bridge]

Release Information Statement introduced in Junos OS Release 9.2.

Description Configure a logical interface to forward packets and learn MAC addresses within each bridge domain configured with a VLAN ID that matches a VLAN ID specified in the list. VLAN IDs can be entered individually using a space to separate each ID, entered as an inclusive list separating the starting VLAN ID and ending VLAN ID with a hyphen, or a combination of both.

Options *number number*—Individual VLAN IDs separated by a space.
number-number—Starting VLAN ID and ending VLAN ID in an inclusive range.
Range: 1 through 4095

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- [Configuring a Logical Interface for Trunk Mode](#)
- [Configuring the VLAN ID List for a Trunk Interface](#)

vlan-id-range

Syntax	<code>vlan-id-range <i>vlan-id-vlan-id</i></code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 8.4.
Description	Bind a range of VLAN IDs to a logical interface.
Options	number —The first number is the lowest VLAN ID in the range the second number is the highest VLAN ID in the range. Range: 1 through 4094



NOTE: Configuring `vlan-id-range` with the entire `vlan-id` range is an unnecessary waste of system resources and is not best practice. It should be used only when a subset of VLAN IDs (not the entire range) needs to be associated with a logical interface. If you specify the entire range (1-4094), it has the same result as not specifying a range; however, it consumes PFE resources such as VLAN lookup tables entries, and so on.

The following examples illustrate this further:

```
[edit interfaces interface-name]
vlan-tagging;
unit number {
    vlan-id-range 1-4094;
}

[edit interfaces interface-name]
unit 0;
```

VLAN ID 0 is reserved for tagging the priority of frames.

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Binding a Range of VLAN IDs to a Logical Interface

vlan-ranges

Syntax

```
vlan-ranges {  
  access-profile profile-name;  
  authentication {  
    password password-string;  
    username-include {  
      circuit-type;  
      delimiter delimiter-character;  
      domain-name domain-name-string;  
      interface-name;  
      mac-address;  
      option-82;  
      radius-realm radius-realm-string;  
      user-prefix user-prefix-string;  
    }  
  }  
  dynamic-profile profile-name {  
    accept (any | dhcp-v4 | inet);  
    ranges (any | low-tag)—(any | high-tag);  
  }  
  override;  
}
```

Hierarchy Level [edit interfaces *interface-name* dynamic-profile *profile-name*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Configure multiple VLANs. Each VLAN is assigned a VLAN ID number from the range.

Options *any*—Any valid VLAN ID number.

vlan-id-low—Specify the first VLAN ID number for the group of VLANs.

vlan-id-high—Specify the last VLAN ID number for the group of VLANs.

Range: 1 through 4094

The remaining statements are explained separately.

Required Privilege routing—To view this statement in the configuration.

Level routing—control—To add this statement to the configuration.

Related Documentation

- Configuring Single-Level VLAN Ranges for Use with VLAN Dynamic Profiles
- Configuring Dynamic Mixed VLAN Ranges

vlan-rewrite

Syntax	<code>vlan-rewrite translate (200 500 201 501)</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>number</i> family bridge interface-mode trunk]
Release Information	Statement introduced in Junos OS Release 9.4.
Description	Translates an incoming VLAN to a bridge-domain VLAN, corresponding counter translation at egress. Supports translation of VLAN 200 to VLAN 500 and VLAN 201 to VLAN 501. Other valid VLANs pass through without translation.
Options	<p>translate 200 500—Translates incoming packets with VLAN 200 to 500.</p> <p>translate 201 501—Translates incoming packets with VLAN 201 to 501.</p> <p>translate 202 502—Translates incoming packets with VLAN 202 to 502.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Rewriting a VLAN Tag and Adding a New Tag

vlan-rule (100-Gigabit Ethernet)

Syntax	<code>vlan-rule (high-low odd-even);</code>
Hierarchy Level	[edit chassis fpc <i>slot</i> pic <i>slot</i> forwarding-mode vlan-steering]
Release Information	Statement introduced in Junos OS Release 10.4.
Description	<p>Configure the interoperation mode of the 100-Gigabit Ethernet PIC when interoperating with 100 gigabit Ethernet interfaces from other vendors.</p> <p>If no VLAN rule is configured, all tagged packets are distributed to PFE0.</p>
Options	<p>high-low—VLAN IDs 1 through 2047 are distributed to PFE0 and VLAN IDs 2048 through 4096 are distributed to PFE1.</p> <p>odd-even—Odd number VLAN IDs are distributed to PFE1 and even number VLAN IDs are distributed to PFE0.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring 100-Gigabit Ethernet PIC VLAN Steering Mode • forwarding-mode (100-Gigabit Ethernet) on page 453 • vlan-steering (100-Gigabit Ethernet) on page 796

vlan-steering (100-Gigabit Ethernet)

Syntax	<pre>vlan-steering { vlan-rule (high-low odd-even); }</pre>
Hierarchy Level	[edit chassis fpc slot pic slot forwarding-mode]
Release Information	Statement introduced in Junos OS Release 9.4.
Description	<p>Configure the 100-Gigabit Ethernet PIC to interoperate with 100 gigabit Ethernet interfaces from other vendors.</p> <p>See sa-multicast regarding interoperability with 100-Gigabit Ethernet PICs from Juniper Networks.</p> <p>The other statement is explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring 100-Gigabit Ethernet PIC VLAN Steering Mode• forwarding-mode (100-Gigabit Ethernet) on page 453• sa-multicast (100-Gigabit Ethernet) on page 687• vlan-rule (100-Gigabit Ethernet) on page 795

vlan-tagging

Syntax	vlan-tagging;
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	For Fast Ethernet and Gigabit Ethernet interfaces and aggregated Ethernet interfaces configured for VPLS, enable the reception and transmission of 802.1Q VLAN-tagged frames on the interface.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• 802.1Q VLANs Overview• vlan-id• Configuring a Layer 3 Subinterface (CLI Procedure)• Configuring Tagged Aggregated Ethernet Interfaces• Example: Configuring Layer 3 Subinterfaces for a Distribution Switch and an Access Switch

vlan-tags

See the following sections:

- **vlan-tags (Dual-Tagged Logical Interface)** on page 799
- **vlan-tags (Stacked VLAN Tags)** on page 801

vlan-tags (Dual-Tagged Logical Interface)

Syntax	<code>vlan-tags inner-list [vlan-id vlan-id–vlan-id] outer <tpid.>vlan-id;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 9.5.
Description	(MX Series routers only) Binds a dual-tag logical interface to a list of VLAN IDs. Configures the logical interface to receive and forward any dual-tag frame whose inner VLAN ID tag matches the list of VLAN IDs you specify.



NOTE:

To create a circuit cross-connect (CCC) using VLAN-bundled dual-tag logical interfaces on Layer 2 VPN routing instances, you must include the `encapsulation-type` statement and specify the value `ethernet-vlan` at the one of the following hierarchy levels:

- [edit routing-instances *routing-instance-name* protocols l2vpn]
- [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols l2vpn]

For more information about the `encapsulation-type` configuration statement and the Layer 2 encapsulation types `ethernet` and `ethernet-vlan`, see the [Junos OS VPNs Configuration Guide](#).

Options `inner-list [vlan-id vlan-id vlan-id–vlan-id]`—A list of valid VLAN ID numbers. Specify the VLAN IDs individually by using a space to separate each ID, as an inclusive list by separating the starting VLAN ID and ending VLAN ID with a hyphen, or as a combination of both.

Range: 1 through 4094. VLAN ID 0 is reserved for tagging the priority of frames.

`outer <tpid.>vlan-id`—An optional Tag Protocol ID (TPID) and a valid VLAN ID.

Range: For TPID, specify a hexadecimal value in the format `0xnnnn`.

Range: For VLAN ID, 1 through 4094. VLAN ID 0 is reserved for tagging the priority of frames.



NOTE: Configuring `inner-list` with the entire `vlan-id` range is an unnecessary waste of system resources and is not best practice. It should be used only when a subset of VLAN IDs of inner tag (not the entire range) needs to be associated with a logical interface. If you specify the entire range (1 through 4094), it has the same result as not specifying a range; however, it consumes PFE resources such as VLAN lookup tables entries, and so on.

The following examples illustrate this further:

```
[edit interfaces interface-name]  
vlan-tagging;  
unit number {  
    vlan-tags outer vid inner-list 1-4094;  
}  
  
[edit interfaces interface-name]  
vlan-tagging;  
unit number {  
    vlan-id vid;  
}
```

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

- Related Documentation**
- Binding VLAN IDs to Logical Interfaces
 - [encapsulation \(Logical Interface\) on page 421](#)
 - [encapsulation \(Physical Interface\) on page 424](#)
 - encapsulation-type (Layer 2 VPN routing instance), see the [Junos OS VPNs Configuration Guide](#).
 - [flexible-vlan-tagging on page 449](#)
 - [vlan-id-list \(Ethernet VLAN Circuit\) on page 791](#)
 - [vlan-tagging on page 797](#)

vlan-tags (Stacked VLAN Tags)

Syntax	<code>vlan-tags inner <i>tpid.vlan-id</i> inner-range <i>vid1—vid2</i> outer <i>tpid.vlan-id</i>;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Gigabit Ethernet IQ and IQE interfaces only, binds TPIDs and 802.1Q VLAN tag IDs to a logical interface. You must include the stacked-vlan-tagging statement at the <code>[edit interfaces <i>interface-name</i>]</code> hierarchy level.



NOTE: The `inner-range vid1—vid2` option is supported on MX Series with IQE PICs only.

Options	<p><code>inner <i>tpid.vlan-id</i></code>—A TPID and a valid VLAN identifier.</p> <p>Range: For VLAN ID, 1 through 4094. VLAN ID 0 is reserved for tagging the priority of frames.</p> <p><code>inner-range <i>vid1—vid2</i></code>—For MX Series routers with Enhanced IQ (IQE) PICs only; specify a range of VLAN IDs where <i>vid1</i> is the start of the range and <i>vid2</i> is the end of the range.</p> <p>Range: For VLAN ID, 1 through 4094. VLAN ID 0 is reserved for tagging the priority of frames.</p> <p><code>outer <i>tpid.vlan-id</i></code>—A TPID and a valid VLAN identifier.</p> <p>Range: For VLAN ID, 1 through 511 for normal interfaces, and 512 through 4094 for VLAN CCC interfaces. VLAN ID 0 is reserved for tagging the priority of frames.</p>
----------------	--



NOTE: Configuring `inner-range` with the entire `vlan-id` range is an unnecessary waste of system resources and is not best practice. It should be used only when a subset of VLAN IDs of inner tag (not the entire range) needs to be associated with a logical interface. If you specify the entire range (1-4094), it has the same result as not specifying a range; however, it consumes PFE resources such as VLAN lookup table entries, and so on.

The following examples illustrate this further:

```
[edit interfaces interface-name

    stacked-vlan-tagging;
    unit number {
        vlan-tags outer vid inner-range 1-4094;
    }

[edit interfaces interface-name
vlan-tagging;
```

```
unit number {  
    vlan-id vid;  
}
```

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- [Configuring Dual VLAN Tags](#)
- [stacked-vlan-tagging on page 721](#)

vlan-tags-outer

Syntax `vlan-tags-outer vlan-tag;`

Hierarchy Level [edit interfaces *interface-set* *interface-set-name* interface *interface-name*]

Release Information Statement introduced in Junos OS Release 8.5.

Description The S-VLAN outer tag that belongs to a set of interfaces used to configure hierarchical CoS schedulers.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- [Junos OS Class of Service Configuration Guide](#)

vlan-vci-tagging

Syntax `vlan-vci-tagging;`

Hierarchy Level [edit interfaces *interface-name*],
[edit logical-systems *logical-system-name* interfaces *interface-name*]

Release Information Statement introduced in Junos OS Release 9.0.

Description Enable the ATM-to-Ethernet interworking cross-connect function on a Gigabit Ethernet, 10-Gigabit Ethernet, or aggregated Ethernet interface.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- [Configuring ATM-to-Ethernet Interworking on page 236](#)

vpi

See the following sections:

- **vpi (ATM CCC Cell-Relay Promiscuous Mode)** on page 803
- **vpi (Define Virtual Path)** on page 804
- **vpi (Logical Interface and Interworking)** on page 805

vpi (ATM CCC Cell-Relay Promiscuous Mode)

Syntax	<code>vpi vpi-identifier;</code>
Hierarchy Level	[edit interfaces <i>at-fpc/pic/port</i> atm-options promiscuous-mode]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM interfaces, allow all VCIs in this VPI to open in ATM CCC cell-relay mode.</p> <p>When you include vpi statements at the [edit interfaces <i>interface-name</i> atm-options promiscuous-mode] hierarchy level, the specified VPIs open in promiscuous mode.</p>
Options	<p>vpi-identifier—ATM virtual path identifier. This is one of the VPIs that you define in the vci statement. (For a list of hierarchy levels at which you can include the vci statement, see vci.)</p> <p>Range: 0 through 255</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring ATM Cell-Relay Promiscuous Mode

vpi (Define Virtual Path)

Syntax `vpi vpi-identifier {
 maximum-vcs maximum-vcs;
 oam-liveness {
 up-count cells;
 down-count cells;
 }
 oam-period (disable | seconds);
 shaping {
 (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
 length);
 queue-length number;
 }
 }`

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description For ATM interfaces, configure the virtual path (VP).

Options *vpi-identifier*—ATM virtual path identifier. This is one of the VPIs that you define in the **vci** statement. (For a list of hierarchy levels at which you can include the **vci** statement, see **vci**.)

Range: 0 through 255

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

Related Documentation

- Configuring the Maximum Number of ATM1 VCs on a VP
- [multipoint-destination on page 582](#)
- [promiscuous-mode on page 657](#)
- [vci on page 785](#)

vpi (Logical Interface and Interworking)

Syntax	<code>vpi virtual-path-identifier;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 9.0.
Description	VPI used in an ATM-to-Ethernet interworking cross-connect.
Options	virtual-path-identifier —VPI to be used. Range: 0 through 255
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring ATM-to-Ethernet Interworking on page 236 Configuring ATM Cell-Relay Promiscuous Mode

vtmapping

Syntax	<code>vtmapping (itu-t klm);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options]; [edit chassis <i>fpc number</i> <i>pic number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For the Channelized STM1 IQ PIC or Channelized STM1 PIC, configure virtual tributary mapping. For the Channelized STM1 PIC, you configure virtual tributary mapping at the [edit chassis <i>fpc number</i> <i>pic number</i>] hierarchy level.
Options	itu-t —International Telephony Union standard. klm —KLM standard. Default: klm
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Virtual Tributary Mapping of Channelized STM1 Interfaces Junos OS System Basics Configuration Guide

warning

Syntax	<code>warning low-light-warning { (link-down syslog); }</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> optics-options]
Release Information	Statement introduced in Junos OS Release 10.0.
Description	Specifies the action to take if the receiving optics signal is below the optics low light warning threshold.
Options	link-down —Drops the 10-Gigabit Ethernet link and marks link as down. syslog —Writes the optics information to the system log.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring 10-Gigabit Ethernet Link Down Notification for Optics Options Alarm or Warning

watch-list

Syntax	<code>watch-list { [routes]; }</code>
Hierarchy Level	[edit interfaces dln unit <i>logical-unit-number</i> dialer-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	On J Series Services Routers with ISDN interfaces, configure an ISDN list of routes to watch. Used only for dialer watch.
Options	routes —IP prefix of a route. Specify one or more. The primary interface is considered up if there is at least one valid route for any of the addresses in the watch list to an interface other than the backup interface.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Dialer Watch<i>Junos OS Interfaces and Routing Configuration Guide</i>

wavelength

Syntax	<code>wavelength <i>nm</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> optics-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For 10-Gigabit Ethernet DWDM interfaces only, configure full C-band ITU-Grid tunable optics.
Options	<p><i>nm</i>—Wavelength value. It can be one of the following:</p> <ul style="list-style-type: none"> • 1528.77—1528.77 nanometers (nm), corresponds from 50 through 100 gigahertz (GHz) • 1529.16—1529.16 nm, corresponds to 50 GHz • 1529.55—1529.55 nm, corresponds from 50 through 100 GHz • 1529.94—1529.94 nm, corresponds to 50 GHz • 1530.33—1530.33 nm, corresponds to 50 to 100 GHz • 1530.72—1530.72 nm, corresponds to 50 GHz • 1531.12—1531.12 nm, corresponds from 50 through 100 GHz • 1531.51—1531.51 nm, corresponds to 50 GHz • 1531.90—1531.90 nm, corresponds from 50 through 100 GHz • 1532.29—1532.29 nm, corresponds to 50 GHz • 1532.68—1532.68 nm, corresponds from 50 through 100 GHz • 1533.07—1533.07 nm, corresponds to 50 GHz • 1533.47—1533.47 nm, corresponds from 50 through 100 GHz • 1533.86—1533.86 nm, corresponds to 50 GHz • 1534.25—1534.25 nm, corresponds from 50 through 100 GHz • 1534.64—1534.64 nm, corresponds to 50 GHz • 1535.04—1535.04 nm, corresponds from 50 through 100 GHz • 1535.43—1535.43 nm, corresponds to 50 GHz • 1535.82—1535.82 nm, corresponds from 50 through 100 GHz • 1536.22—1536.22 nm, corresponds to 50 GHz • 1536.61—1536.61 nm, corresponds from 50 through 100 GHz • 1537.00—1537.00 nm, corresponds to 50 GHz • 1537.40—1537.40 nm, corresponds from 50 through 100 GHz • 1537.79—1537.79 nm, corresponds to 50 GHz

- **1538.19**—1538.19 nm, corresponds from 50 through 100 GHz
- **1538.58**—1538.58 nm, corresponds to 50 GHz
- **1538.98**—1538.98 nm, corresponds from 50 through 100 GHz
- **1539.37**—1539.37 nm, corresponds to 50 GHz
- **1539.77**—1539.77 nm, corresponds from 50 through 100 GHz
- **1540.16**—1540.16 nm, corresponds to 50 GHz
- **1540.56**—1540.56 nm, corresponds from 50 through 100 GHz
- **1540.95**—1540.95 nm, corresponds to 50 GHz
- **1541.35**—1541.35 nm, corresponds from 50 through 100 GHz
- **1541.75**—1541.75 nm, corresponds to 50 GHz
- **1542.14**—1542.14 nm, corresponds from 50 through 100 GHz
- **1542.54**—1542.54 nm, corresponds to 50 GHz
- **1542.94**—1542.94 nm, corresponds from 50 through 100 GHz
- **1543.33**—1543.33 nm, corresponds to 50 GHz
- **1543.73**—1543.73 nm, corresponds to 50 to 100 GHz
- **1544.13**—1544.13 nm, corresponds to 50 GHz
- **1544.53**—1544.53 nm, corresponds from 50 through 100 GHz
- **1544.92**—1544.92 nm, corresponds to 50 GHz
- **1545.32**—1545.32 nm, corresponds from 50 through 100 GHz
- **1545.72**—1545.72 nm, corresponds to 50 GHz
- **1546.12**—1546.12 nm, corresponds from 50 through 100 GHz
- **1546.52**—1546.52 nm, corresponds to 50 GHz
- **1546.92**—1546.92 nm, corresponds from 50 through 100 GHz
- **1547.32**—1547.32 nm, corresponds to 50 GHz
- **1547.72**—1547.72 nm, corresponds from 50 through 100 GHz
- **1548.11**—1548.11 nm, corresponds to 50 GHz
- **1548.51**—1548.51 nm, corresponds from 50 through 100 GHz
- **1548.91**—1548.91 nm, corresponds to 50 GHz
- **1549.32**—1549.32 nm, corresponds from 50 through 100 GHz
- **1549.72**—1549.72 nm, corresponds to 50 GHz
- **1550.12**—1550.12 nm, corresponds from 50 through 100 GHz
- **1550.52**—1550.52 nm, corresponds to 50 GHz
- **1550.92**—1550.92 nm, corresponds from 50 through 100 GHz

- **1551.32**—1551.32 nm, corresponds to 50 GHz
- **1551.72**—1551.72 nm, corresponds from 50 through 100 GHz
- **1552.12**—1552.12 nm, corresponds to 50 GHz
- **1552.52**—1552.52 nm, corresponds from 50 through 100 GHz
- **1552.93**—1552.93 nm, corresponds to 50 GHz
- **1553.33**—1554.33 nm, corresponds from 50 through 100 GHz
- **1553.73**—1554.73 nm, corresponds to 50 GHz
- **1554.13**—1554.13 nm, corresponds from 50 through 100 GHz
- **1554.54**—1554.54 nm, corresponds to 50 GHz
- **1554.94**—1554.94 nm, corresponds from 50 through 100 GHz
- **1555.34**—1555.34 nm, corresponds to 50 GHz
- **1555.75**—1555.75 nm, corresponds from 50 through 100 GHz
- **1556.15**—1556.15 nm, corresponds to 50 GHz
- **1556.55**—1556.55 nm, corresponds from 50 through 100 GHz
- **1556.96**—1556.96 nm, corresponds to 50 GHz
- **1557.36**—1557.36 nm, corresponds from 50 through 100 GHz
- **1557.77**—1557.77 nm, corresponds to 50 GHz
- **1558.17**—1558.17 nm, corresponds from 50 through 100 GHz
- **1558.58**—1558.58 nm, corresponds to 50 GHz
- **1558.98**—1558.98 nm, corresponds from 50 through 100 GHz
- **1559.39**—1559.39 nm, corresponds to 50 GHz
- **1559.79**—1559.79 nm, corresponds from 50 through 100 GHz
- **1560.20**—1560.20 nm, corresponds to 50 GHz
- **1560.61**—1560.61 nm, corresponds to 50 to 100 GHz
- **1561.01**—1561.01 nm, corresponds to 50 GHz
- **1561.42**—1561.42 nm, corresponds from 50 through 100 GHz
- **1561.83**—1561.83 nm, corresponds to 50 GHz
- **1562.23**—1562.23 nm, corresponds from 50 through 100 GHz
- **1562.64**—1562.64 nm, corresponds to 50 GHz
- **1563.05**—1563.05 nm, corresponds from 50 through 100 GHz
- **1563.45**—1563.45 nm, corresponds to 50 GHz
- **1563.86**—1563.86 nm, corresponds from 50 through 100 GHz
- **Default: 1550.12**—1550.12 nm, corresponds from 50 through 100 GHz

Required Privilege interface—To view this statement in the configuration.
Level interface-control—To add this statement to the configuration.

Related Documentation

- 10-Gigabit Ethernet DWDM Interface Wavelength Overview

west-interface

Syntax

```
west-interface {  
    node-id mac-address;  
    control-channel channel-name {  
        ring-protection-link-end;  
    }  
}
```

Hierarchy Level [edit protocols **protection-group** ethernet-ring *ring-name*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Define one of the two interface ports for Ethernet ring protection, the other being defined by the **east-interface** statement at the same hierarchy level. The interface must use the control channel's logical interface name. The control channel is a dedicated VLAN channel for the ring port.



NOTE: Always configure this port second, after configuring the **east-interface** statement.

.....

The statements are explained separately.

Required Privilege interface—To view this statement in the configuration.
Level interface-control—To add this statement to the configuration.

Related Documentation

- Ethernet Ring Protection Switching Overview
- Ethernet Ring Protection Using Ring Instances for Load Balancing
- **east-interface** on page 419
- **ethernet-ring** on page 434

working-circuit

Syntax	<code>working-circuit <i>group-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the working router in an APS circuit pair.
Options	<i>group-name</i> —Circuit's group name.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Basic APS Supportprotect-circuit on page 657

yellow-differential-delay

Syntax	<code>yellow-differential-delay <i>milliseconds</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For link services and voices interfaces only, configure the yellow differential delay among bundle links to give warning when a link has a differential delay that exceeds the configured threshold.
Options	<i>milliseconds</i> —Yellow differential delay threshold. Range: 1 through 2000 milliseconds Default: 6 milliseconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Junos OS Services Interfaces Configuration Guideaction-red-differential-delay on page 304remote on page 674

z0-increment

Syntax	(z0-increment no-z0-increment);
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure an incremental STM ID rather than a static one.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring an Incrementing STM ID• sonet-options on page 710

PART 6

Index

- Index on page 815
- Index of Statements and Commands on page 835

Index

Symbols

#, comments in configuration statements.....xl	
(), in syntax descriptions.....xl	
10-Gigabit Ethernet LAN/WAN PIC	
no-pre-classifier statement.....595	
oversubscribed Ethernet mode	
control queue disable.....595	
100-Gigabit Ethernet	
configuration	
forwarding-mode.....453	
sa-multicast.....687	
vlan-rule.....795	
vlan-steering.....796	
forwarding-options	
sa-multicast.....687	
vlan-steering.....796	
vlan-steering	
vlan-rule.....795	
128-bit IPv6 address.....184	
32-bit IPv4 address.....184	
802.1Q VLANs	
dynamic.....327	
mixed VLAN tagging.....449, 588	
VLAN IDs.....788, 793	
VLAN tagging.....797	
802.1Q/Ethernet 802.3 encapsulation	
encapsulation overhead.....114	
802.1Q/Ethernet SNAP encapsulation	
encapsulation overhead.....114	
802.1x Port-Based Network Access Control.....405	
802.3ad statement.....291	
< >, in syntax descriptions.....xxxix	
[], in configuration statements.....xl	
{ }, in configuration statements.....xl	
(pipe), in syntax descriptions.....xl	

A

accept statement.....292	
accept-source-mac statement.....293	

access profile	
configuring.....122	
default CHAP secret.....123	
default PAP password.....172	
access-concentrator statement.....294	
access-profile statement.....295	
usage guidelines.....121, 124	
accounting profiles	
logical interfaces.....166	
example configuration.....166	
physical interfaces.....140	
example configuration.....140	
accounting statement.....296	
usage guidelines.....218	
accounting-profile statement.....296	
usage guidelines.....140, 166	
acfc statement.....297	
usage guidelines.....129	
acknowledge-retries statement.....298	
acknowledge-timer statement.....299	
usage guidelines.....299	
action statement	
OAM.....300	
policer.....300	
action-profile statement	
applying to remote MEP.....301	
CFM.....302	
LFM.....303	
action-red-differential-delay statement.....304	
usage guidelines.....304	
activation-delay statement.....304	
activation-priority statement.....305	
address and control field compression.....129	
address entries.....47	
address statement.....306	
usage guidelines.....182, 190	
advertise-interval statement.....307	
ae	
physical part of interface name.....49	
age statement.....308	

agent-specifier statement	
PPPoE.....	309
aggregate statement.....	311
hierarchical policer.....	312
aggregate-ports statement.....	313
aggregated Ethernet	
targeted distribution of	
subscribers.....	544, 669, 741
aggregated Ethernet interfaces	
CCC.....	242, 243
Layer 2 VPNs.....	243
aggregated-ether-options statement.....	314
aggregated-sonet-options statement.....	315
alarm statement.....	316
all (tracing flag)	
interfaces.....	146
allow-any-vci statement.....	316
allow-fragmentation statement.....	317
allow-remote-loopback statement.....	317
annex statement.....	318
apply-action-profile statement.....	318
aps statement.....	319
annex-b.....	318
arp option	
policers.....	199
arp statement.....	320
as	
physical part of interface name.....	49
asynchronous-notification statement.....	321
at	
physical part of interface name.....	49
ATM cell-relay encapsulation	
encapsulation overhead.....	114
ATM encapsulation	
ATM PVC encapsulation.....	114, 116
keepalives.....	136
Layer 2 switching cross-connects.....	231
ATM interfaces	
encapsulation.....	116
MTU sizes.....	107, 108, 110
ATM PVC encapsulation.....	114, 116
atm-encapsulation statement.....	321
atm-options statement.....	322
atm-scheduler-map statement	323
ATM-to-Ethernet interworking.....	229, 236, 802
VCI range.....	786
virtual path identifier.....	805
VLAN tagging.....	489, 788
ATM2 IQ interfaces	
MTU sizes.....	109, 110
authentication statement	
stacked vlan ranges.....	324
vlan ranges.....	324
authentication-key statement.....	325
authentication-profile-name statement.....	325
authenticator statement.....	326
auto-configure statement.....	327
auto-discovery statement.....	328
auto-negotiation statement	
Gigabit Ethernet.....	329
auto-reconnect statement.....	330
auto-synchronize statement	
usage guidelines.....	281
B	
backup-destination statement.....	330
backup-interface statement.....	331
backup-options statement.....	331
bandwidth statement.....	332
usage guidelines.....	166
bandwidth-limit statement	
hierarchical policer.....	333
policer for Gigabit Ethernet interface.....	334
bchannel-allocation statement.....	334
bcm0	
internal Ethernet interface.....	28
physical part of interface name.....	49
bcm0 interface.....	252
bearer-bandwidth-limit statement.....	335
BERT	
configuring interface diagnostics.....	143
bert-algorithm statement.....	336
usage guidelines.....	143
bert-error-rate statement.....	338
usage guidelines.....	143
bert-period statement.....	339
usage guidelines.....	143
bit error rate test See BERT	
BOOTP	
accepting packets.....	217
Bootstrap Protocol See BOOTP	
borrower interface	
unnumbered Ethernet or demux.....	191
br	
physical part of interface name.....	49
braces, in configuration statements.....	xl

- brackets
 - angle, in syntax descriptions.....xxxix
 - square, in configuration statements.....xl
 - bridge-domain statement.....340
 - broadcast statement.....341
 - usage guidelines.....182
 - buildout statement
 - E3 or T3 over ATM interfaces.....342
 - T1 interfaces.....343
 - bundle statement.....344
 - burst-size-limit statement
 - hierarchical policer.....345
 - policer for Gigabit Ethernet interface.....345
 - byte encoding.....346
 - byte-encoding statement.....346
 - bytes statement.....347
- C**
- C-bit parity mode.....352
 - calculation-weight statement.....348
 - callback statement.....349
 - callback-wait-period statement.....350
 - caller statement.....351
 - calling-number statement.....352
 - cau4
 - physical part of interface name.....49
 - cbit-parity statement.....352
 - cbr statement.....353
 - CCC.....229
 - aggregated Ethernet.....242, 243
 - encapsulation
 - VLAN-bundled dual-tag logical
 - interfaces.....799
 - VLAN-bundled single-tag logical
 - interfaces.....791
 - Layer 2 VPNs.....243
 - cel
 - physical part of interface name.....49
 - cell-bundle-size statement.....354
 - Challenge Handshake Authentication Protocol See CHAP
 - channel part of interface name.....54
 - CHAP.....121, 124
 - configuring default CHAP secret.....123
 - example configuration.....123, 126
 - chap statement.....355
 - usage guidelines.....121, 124
 - chap-secret statement.....356
 - ci
 - physical part of interface name.....49
 - circuit cross-connect (CCC)
 - encapsulation
 - VLAN-bundled dual-tag logical
 - interfaces.....799
 - VLAN-bundled single-tag logical
 - interfaces.....791
 - circuit cross-connect CCC.....229
 - circuit-type statement
 - stacked vlan ranges.....356
 - vlan ranges.....356
 - Cisco HDLC encapsulation.....116
 - configuring on physical interfaces.....116
 - encapsulation overhead.....114
 - keepalives.....136
 - Layer 2 switching cross-connect.....231
 - cisco-interoperability statement.....357
 - classifier statement.....357
 - clear-dont-fragment-bit statement.....358
 - client statement.....358
 - clock rates.....280
 - clock sources.....63, 137, 360
 - clock-rate statement.....359
 - usage guidelines.....280
 - clocking modes.....280
 - clocking statement.....360
 - usage guidelines.....63, 137
 - clocking-mode statement.....361
 - usage guidelines.....279
 - coc1
 - physical part of interface name.....49
 - coc12
 - physical part of interface name.....49
 - coc3
 - physical part of interface name.....49
 - coc48
 - physical part of interface name.....49
 - comments, in configuration statements.....xl
 - compatibility-mode statement.....362
 - compression.....170
 - compression statement.....363
 - usage guidelines.....129, 130
 - compression-device statement.....364
 - connections statement.....365
 - usage guidelines.....234
 - connectivity-fault management.....301, 302
 - connectivity-fault-management statement.....366
 - container interfaces.....34

container-devices statement.....	368	data-tlv-size statement.....	378
device-count.....	368	dcd statement.....	379
container-list statement.....	368	usage guidelines.....	281
container-options statement.....	369	dcd-polarity statement.....	379
container-type statement.....	369	usage guidelines.....	284
continuity-check statement.....	370	DCE.....	380
control leads		dce statement.....	380
serial interfaces.....	281	dce-options statement.....	380
control-channel statement.....	371	deactivation-delay statement.....	381
control-leads statement		default router addresses.....	197
usage guidelines.....	281	default-actions statement.....	381
control-polarity statement.....	371	default-chap-secret statement.....	382
usage guidelines.....	284	default-pap-password statement.....	382
control-signal statement.....	372	delay statement.....	384
usage guidelines.....	281	PPPoE service name tables.....	383
conventions		delay-variation statement.....	385
text and syntax.....	xxxix	delegate-server-processing statement.....	385
copy-tos-to-outer-ip-header statement.....	372	delimiter statement	
core-dump statement.....	373	stacked vlan ranges.....	386
usage guidelines.....	147	vlan ranges.....	386
cp		demux	
physical part of interface name.....	49	physical part of interface name.....	49
crc-major-alarm-threshold statement.....	373	demux interfaces.....	257
crc-minor-alarm-threshold statement.....	374	configuring underlying interfaces for.....	259, 261
cstm1		unnumbered.....	191
physical part of interface name.....	49	demux-destination statement.....	387
cstm16		demux interfaces.....	388
physical part of interface name.....	49	demux-options statement.....	388
cstm4		demux-source statement.....	389, 390
physical part of interface name.....	49	demux interfaces.....	389
ctl		demux0 statement.....	391
physical part of interface name.....	49	description statement.....	392
ct3		example configuration.....	105
physical part of interface name.....	49	usage guidelines.....	104, 164
cts statement.....	374	descriptors, interface.....	47
usage guidelines.....	281	destination statement.....	393
cts-polarity statement.....	375	usage guidelines.....	182, 189
usage guidelines.....	284	destination-class usage	
curly braces, in configuration statements.....	xl	example configuration.....	221
current statement.....	375	destination-class-usage statement.....	395
customer support.....	xl	usage guidelines.....	218
contacting JTAC.....	xl	destination-profile	
cycle-time statement.....	376	usage guidelines.....	189
		destination-profile statement.....	395
		usage guidelines.....	182
		dfc	
		physical part of interface name.....	49
		DHCP	
		accepting.....	217

D

damping

 interface transitions.....147

data-channel statement.....376

data-input statement.....377

-
- dial-options statement.....396
 - dial-string statement.....396
 - dialer statement.....397
 - dialer-options statement.....398
 - dialin statement.....399
 - direction statement.....399
 - disable statement.....400
 - link protection.....401
 - logical interfaces
 - usage guidelines.....175
 - physical interfaces
 - usage guidelines.....149
 - disable-mlppp-inner-ppp-pfc statement.....401
 - disabling
 - keepalives.....136
 - logical interfaces.....175
 - physical interfaces.....149
 - example configuration.....150
 - discard interface.....255
 - dlci statement.....402
 - do-not-fragment statement.....403
 - documentation
 - comments on.....xl
 - domain-name statement
 - DHCP relay agent.....404
 - donor interface
 - unnumbered Ethernet or demux.....191
 - dot1x statement.....405
 - authenticator.....405
 - authentication-profile-name.....405
 - interface.....405
 - See also* maximum-requests
 - See also* quiet-period
 - See also* reauthentication
 - See also* retries
 - See also* server-timeout
 - See also* supplicant
 - See also* supplicant-timeout
 - See also* transmit-period
 - down-count statement.....406
 - drop statement
 - PPPoE service name tables.....407
 - drop-timeout statement.....407
 - ds
 - physical part of interface name.....49
 - ds0-options statement.....408
 - DS3 IQ interfaces
 - MTU sizes.....107, 108
 - dsc
 - physical part of interface name.....49
 - dsl-options statement.....408
 - dsr statement.....409
 - usage guidelines.....281
 - dsr-polarity statement.....409
 - usage guidelines.....284
 - dte-options statement.....410
 - DTR circuit
 - serial interfaces.....284
 - dtr statement.....411
 - usage guidelines.....281
 - dtr-circuit statement.....412
 - usage guidelines.....284
 - dtr-polarity statement.....412
 - usage guidelines.....284
 - dual-tag framing
 - VLAN ID list.....799
 - dump-on-flow-control statement.....413
 - Dynamic Host Configuration Protocol *See* DHCP
 - dynamic PPPoE statements
 - pppoe-underlying-options.....648
 - dynamic subscribers
 - pppoe-underlying-options statement.....648
 - dynamic VLANs.....327
 - authenticating.....324
 - dynamic-call-admission-control statement.....414
 - dynamic-profile statement
 - PPPoE service name tables.....415
 - stacked VLAN ranges.....416
 - usage guidelines.....171
 - VLAN ranges.....416
- E**
- E-LMI.....538
 - e1
 - physical part of interface name.....49
 - E1 interfaces
 - MTU sizes.....107, 108
 - e1-options statement.....417
 - e3
 - physical part of interface name.....49
 - E3 interfaces
 - encapsulation.....116
 - MTU sizes.....107, 108
 - E3 IQ interfaces
 - MTU sizes.....107, 108
 - e3-options statement.....418
 - east-interface statement.....419

em	
physical part of interface name.....	49
em0	
management Ethernet interface.....	28
management interface.....	29
physical part of interface name.....	49
em1	
internal Ethernet interface.....	28
physical part of interface name.....	49
em1 interface.....	252
em2	
physical part of interface name.....	49
encapsulation.....	116
CCC.....	231
Ethernet 802.3.....	114
example configuration.....	121
on logical interfaces.....	168
on physical interfaces.....	116
overheads.....	114
See also ATM encapsulation	
encapsulation statement.....	420
container interface.....	420
Layer 2 switching cross-connect.....	231
logical interface.....	421
logical interfaces	
usage guidelines.....	168
physical interface.....	424
physical interfaces	
usage guidelines.....	116
encoding	
byte.....	346
line.....	287
encoding statement.....	427
usage guidelines.....	287
epd-threshold statement.....	428
logical interface.....	428
physical interface.....	429
es	
physical part of interface name.....	49
es-options statement.....	429
et	
physical part of interface name.....	49
Ethernet CCC and TCC encapsulation	
physical interfaces.....	116
Ethernet CCC encapsulation	
encapsulation overhead.....	114
Ethernet interfaces	
dynamic VLANs.....	327
internal Ethernet interface.....	29, 251
mixed VLAN tagging.....	449, 588
unnumbered.....	191
preferred source address.....	650
VLAN IDs.....	788
VLAN tagging.....	797
Ethernet over ATM encapsulation	
encapsulation overhead.....	114
physical interfaces.....	116
Ethernet SNAP encapsulation	
encapsulation overhead.....	114
ethernet statement.....	430
Ethernet TCC	
encapsulation	
encapsulation overhead.....	114
Ethernet VLAN circuit	
VLAN ID list.....	791
ethernet-policer-profile statement.....	433
ethernet-ring statement.....	434
ethernet-switch-profile statement.....	435
eui-64 statement.....	436
usage guidelines.....	182
evcs statement.....	437
event (tracing flag).....	146
event statement.....	438
interface-status-tlv statement.....	504
port-status-tlv statement.....	645
event-thresholds	
frame-error statement.....	455
frame-period statement.....	456
frame-period-summary statement.....	457
symbol-period statement.....	731
event-thresholds statement.....	438
extended VLAN	
CCC	
encapsulation.....	116
encapsulation overhead.....	114
TCC	
encapsulation.....	116
encapsulation overhead.....	114
external clock sources.....	137, 360
external synchronization interface	
usage guidelines.....	64
F	
f-max-period statement.....	439
facility-override statement.....	439
fail-filter statement.....	683
usage guidelines.....	212
failover-delay statement.....	440

family bridge		
VLAN ID list.....	792	
VLAN IDs.....	787	
family descriptors.....	47	
family statement.....	441	
usage guidelines.....	180	
family type		
specifying for underlying interfaces.....	262	
Fast Ethernet interfaces		
dynamic VLANs.....	327	
interface speed.....	133	
link modes.....	106	
MTU sizes.....	107, 108	
VLAN IDs.....	788	
VLAN tagging.....	797	
fastether-options statement.....	445	
fcs statement.....	446	
fe		
physical part of interface name.....	49	
feac-loop-respond statement.....	447	
filter statement.....	448	
usage guidelines.....	208	
firewall		
hierarchical-policer.....	465	
firewall filters		
applying.....	208	
example configuration.....	210	
logical interfaces.....	208	
flexible-vlan-tagging statement.....	449	
flow-control statement.....	449	
flow-control-options statement.....	450	
font conventions.....	xxxix	
force statement.....	450	
forward-and-send-to-re statement.....	451	
forward-only statement.....	451	
forwarding-class statement.....	452	
forwarding-mode statement.....	453	
fragment-threshold statement.....	454	
Frame Relay encapsulation.....	116	
DCE.....	380	
encapsulation overhead.....	114	
keepalives.....	136	
Layer 2 switching cross-connect.....	232	
physical interfaces.....	116	
Frame Relay ether type encapsulation		
physical interfaces.....	116	
frame-error statement.....	455	
frame-period statement.....	456	
frame-period-summary statement.....	457	
framing statement.....	458	
10-Gigabit Ethernet interfaces.....	460	
E1, E3, and T1 interfaces.....	459	
SONET and SDH interfaces.....	460	
fxp		
physical part of interface name.....	49	
fxp0		
management Ethernet interface.....	28	
management interface.....	29	
physical part of interface name.....	49	
fxp1		
internal Ethernet interface.....	28	
physical part of interface name.....	49	
fxp1 interface.....	252	
fxp2		
internal Ethernet interface.....	28	
physical part of interface name.....	49	
G		
ge		
physical part of interface name.....	49	
Gigabit Ethernet interfaces		
dynamic VLANs.....	327	
MTU sizes.....	107, 108, 109, 110	
VLAN IDs.....	788, 793	
VLAN tagging.....	489, 788, 797	
gigether-options statement.....	461	
gr		
physical part of interface name.....	49	
gratuitous-arp-reply statement.....	462	
gre		
physical part of interface name.....	49	
group option		
firewall filters.....	208	
guard-interval statement.....	463	
H		
hardware-assisted-timestamping statement.....	463	
HDLC encapsulation		
Cisco HDLC encapsulation.....	116	
hello-timer statement.....	464	
hierarchical-policer statement.....	465	
hierarchical-schedulers statement.....	466	
high-plp-max-threshold statement.....	466	
high-plp-threshold statement.....	467	
hold-interval statement		
connectivity-fault management.....	468	
Ethernet ring protection switching.....	468	

hold-time statement.....	469
APS.....	469
damping interface transitions	
usage guidelines.....	147
Physical Interface.....	470
SONET/SDH Defect Triggers.....	471
host statement.....	472

I

icons defined, notice.....	xxxviii
idle-cycle-flag statement.....	473
serial interfaces	
usage guidelines.....	281
idle-timeout statement.....	474
ieee802.1p statement.....	474
if-exceeding statement	
hierarchical policer.....	475
IGMP snooping	
enabling.....	476
multicast-router interface.....	579
igmp-snooping statement.....	476
ignore statement.....	477
ignore-all statement.....	477
usage guidelines.....	281
ignore-l3-incompletes statement.....	478
ilmi statement.....	478
ima-group-options statement.....	479
ima-link-options statement.....	480
inactivity-timeout statement.....	481
incoming-called-number statement.....	481
incoming-map statement.....	482
indication statement.....	483
usage guidelines.....	281
indication-polarity statement.....	483
usage guidelines.....	284
inet protocol family	
interface addresses.....	184
inet6 protocol family	
interface addresses.....	184
ingress-rate-limit statement.....	484
init-command-string statement.....	485
usage guidelines.....	102
initial-route-check statement.....	486
inner-tag-protocol-id statement.....	487
inner-vlan-id statement.....	488
inner-vlan-id-range statement.....	489
input option	
firewall filters.....	208
policers.....	199

input statement.....	489
input-list statement.....	490
usage guidelines.....	208
input-policer statement.....	490
input-priority-map statement.....	491
input-three-color statement.....	491
input-vlan-map statement.....	492
instance statement.....	493
interface addresses	
logical interfaces.....	182
preferred interface addresses.....	197, 198
primary interface addresses.....	197
interface groups.....	209
interface naming	
chassis, routing matrix.....	59
routing matrix based on a TX Matrix Plus	
router.....	56
routing matrix based on a TX Matrix router.....	54
TX Matrix Plus router.....	56
TX Matrix router.....	54
interface range	
expanding member and member range	
statements.....	96
interface ranges.....	92
configuration.....	92
inheritance range priorities.....	100
inheriting common configuration.....	99
under other hierarchies.....	100
interface statement.....	494
CoS.....	494
IEEE 802.1ag.....	496
IEEE 802.1X.....	495
IEEE 802.3ah.....	497
interface transitions	
damping.....	147
interface-down statement.....	381, 498
interface-mode statement.....	499
interface-name statement	
stacked vlan ranges.....	500
vlan ranges.....	500
interface-range statement.....	501
usage guidelines.....	92
interface-set statement.....	503
interface-status-tlv statement.....	504
interface-switch statement.....	505
usage guidelines.....	230
interface-type statement.....	506

-
- interfaces.....59
 - clock sources.....63, 137, 360
 - configuration statements.....4, 291
 - container interfaces.....34
 - demux underlying.....259, 261
 - descriptive text.....392
 - descriptors.....47
 - disabling.....149, 175
 - display order in configurations.....61
 - encapsulation See encapsulation
 - firewall filters.....208
 - interface-range.....501
 - mixed VLAN tagging.....449, 588
 - names.....48
 - permanent interfaces.....28, 29
 - physical.....65
 - services interfaces.....33
 - transient interfaces.....28, 32
 - interfaces statement.....507
 - interleave-fragments statement.....507
 - internal clock sources.....137, 360
 - internal Ethernet interface.....29, 251
 - Internet Protocol Control Protocol See IPCP
 - interval statement.....508
 - inverse-arp statement.....509
 - invert-data statement.....510
 - ip
 - physical part of interface name.....49
 - IP addresses
 - 128-bit.....184
 - 32-bit.....184
 - IPCP.....188
 - unnumbered interfaces.....190
 - ipc (tracing flag).....146
 - IPCP.....187
 - assigning PPP properties.....189
 - configuring IP address.....188
 - negotiating IP addresses.....188
 - unnumbered interfaces.....189
 - ipip
 - physical part of interface name.....49
 - ipsec-sa statement.....511
 - IPv4 Protocol family
 - interface addresses.....182
 - Same IP Address on Multiple Interfaces.....185
 - on logical interfaces.....180
 - IPv6.....181
 - standards documents.....181
 - transition.....182
 - IPv6 Protocol family
 - on logical interfaces.....180
 - ISDN interfaces
 - callback-wait-period.....350
 - caller.....351
 - calling-number.....352
 - redial-delay.....672
 - isdn-options statement.....512
 - ISO Protocol family.....180, 182
 - iteration-count statement.....513
 - iteration-period statement.....513
 - iw
 - physical part of interface name.....49
 - ixgbe0
 - internal Ethernet interface.....28
 - physical part of interface name.....49
 - ixgbe0 interface.....252
 - ixgbe1
 - internal Ethernet interface.....28
 - physical part of interface name.....49
 - ixgbe1 interface.....252
- K**
- keep-address-and-control statement.....514
 - usage guidelines.....196
 - keepalives
 - disabling.....136
 - keepalives statement.....515
 - usage guidelines.....136
 - key statement.....516
- L**
- l2tp-interface-id statement.....516
 - lacp statement
 - 802.3ad.....517
 - Aggregated Ethernet.....518
 - Layer 2 switching cross-connect
 - CCC connections.....234
 - CCC encapsulation.....231
 - example configuration.....239
 - MPLS.....235
 - router configuration.....230
 - Layer 3 incomplete errors.....478
 - layer2-policer statement.....519
 - lc
 - physical part of interface name.....49

LCC.....	54	local password, configuring.....	126, 173
in a routing matrix based on a TX Matrix Plus		local-name statement.....	542
router.....	56	usage guidelines.....	121, 124
LCP		local-password statement.....	543
address and control field compression.....	129	lockout statement.....	543
protocol field compression.....	130, 170	log-prefix statement.....	544
lcp-max-conf-req statement.....	520	logical interface properties, statements for.....	155
lcp-restart-timer statement.....	520	logical interfaces	
usage guidelines.....	170	accounting profiles.....	166
leaky bucket properties.....	138	example configuration.....	166
level statement.....	521	CCC.....	229, 239
line.....	287	clear loopback detected timer.....	170
protocol.....	275	configuration statements.....	151
line-card chassis See LCC		default router addresses.....	197
line-encoding statement.....	522	descriptive text.....	164
line-protocol statement.....	523	descriptors.....	47
usage guidelines.....	275	disabling.....	175
line-rate statement.....	523	encapsulation See encapsulation	
linear-red-profile statement.....	524	example configuration	
linear-red-profiles statement.....	525	dynamic CAC.....	175
link modes.....	106	firewall filters.....	208
link protection		interface addresses.....	182, 197
disable statement.....	401	interface bandwidth.....	166
non-revertive statement.....	597	Layer 2 switching cross-connect.....	230
revertive statement.....	679	logical interface properties.....	151
link-adjacency-loss statement.....	525	multipoint connections.....	165
link-discovery statement.....	526	point-to-point connections.....	164
link-down statement.....	526	policers.....	199
link-event-rate statement.....	527	PPP restart timers.....	170
link-fault management.....	303	preferred interface addresses.....	197, 198
link-fault-management statement.....	528	primary interface addresses.....	197, 198
link-layer-overhead statement.....	529	primary router addresses.....	197
link-mode statement.....	530	primary router interfaces.....	197
usage guidelines.....	106, 133	protocol families.....	177, 180
link-protection statement.....	531	protocol MTU.....	195
link-speed statement.....	532	protocol redirect messages.....	196
linktrace statement.....	534	SNMP notifications.....	167
LMI packets See keepalives		unit numbers.....	162
lmi statement		unnumbered interfaces.....	190
Ethernet OAM.....	538	VLAN IDs.....	788, 793
Frame Relay keepalives.....	536	VLAN-bundled	
lmi-type statement.....	539	dual-tag.....	799
lo		single-tag.....	791
physical part of interface name.....	49	logical part of interface name.....	53
load-interval statement.....	540	logical routers See logical systems	
load-threshold statement.....	541	logical systems	
Local Management Interface packets See		configuration statements.....	20
keepalives		interfaces.....	163
local name, configuring.....	123, 126, 173		

- logical-interface-fpc-redundancy statement
 - aggregated Ethernet.....544
- logical-interface-policer statement.....545
- logical-systems statement.....545
 - usage guidelines.....163
- long-buildout statement.....546
- loop-timing statement.....547
- loopback capability.....285
 - serial interfaces
 - example configuration.....286
- loopback statement.....548
 - ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3.....549
 - Aggregated Ethernet, Fast Ethernet, and Gigabit Ethernet.....550
 - no-loopback.....548
 - serial.....551
 - serial interfaces
 - usage guidelines.....285
- loopback testing.....141
- loopback-clear-timer statement.....552
 - usage guidelines.....170
- loss-priority statement.....552
- loss-threshold statement.....553
- low-plp-max-threshold statement.....553
- low-plp-threshold statement.....554
- lowest-priority-defect statement.....555
- ls
 - physical part of interface name.....49
- lsi
 - physical part of interface name.....49
- lsq-failure-options statement.....556
- M**
- mac statement.....556
- mac-address statement.....557
 - Accept Source Mac.....557
 - stacked vlan ranges.....557
 - vlan ranges.....557
- mac-learn-enable statement.....558
- mac-validate statement.....559
- maintenance-association statement.....560
- maintenance-domain statement.....561
 - mip-half-function.....571
 - virtual-switch.....786
- management Ethernet interface
 - configuring for M Series and T Series routers.....132
 - configuring J Series Gigabit Ethernet interfaces.....133
 - interface speed.....132
 - link modes.....106
 - overview.....29
- management interface
 - em0.....29
 - fxp0.....29
- manuals
 - comments on.....xl
- master-only statement.....562
- max-sessions statement
 - PPPoE service name tables.....565
- maximum transmission unit *See* MTU
- maximum-contexts statement.....563
- maximum-requests statement.....563
- maximum-vcs statement.....564
- mc-ae statement.....566
- measurement-type statement.....567
- media (tracing flag).....146
- media MTUs.....106
 - See also* MTU
- member interfaces
 - expanding.....98
 - inheritance.....97
- member statement
 - usage guidelines.....92
- member-interface-speed statement.....567
- member-interface-type statement.....568
- member-range statement
 - usage guidelines.....92
- mep statement.....569
- minimum-links statement.....570
- mip-half-function statement.....571
- mixed VLAN tagging.....449, 588
- ml
 - physical part of interface name.....49
- mlfr-uni-nni-bundle-options statement.....572
- mo
 - physical part of interface name.....49
- mode statement.....573
 - usage guidelines.....214
- modem-options statement.....573
 - usage guidelines.....102
- monitor-session statement.....574
 - usage guidelines.....128

monitoring services interfaces		
physical interface properties.....	147	
MPLS		
Layer 2 switching cross-connect.....	235	
protocol family.....	180, 182	
mpls statement.....	574	
mrru statement.....	575	
ms		
physical part of interface name.....	49	
mt		
physical part of interface name.....	49	
MTU		
physical interfaces.....	106	
mtu statement.....	576	
logical interfaces		
usage guidelines.....	195	
usage guidelines.....	106	
mtun		
physical part of interface name.....	49	
MTUs		
logical interfaces.....	195	
protocol MTUs.....	195	
multi-chassis-protection		
peer statement.....	626	
multi-chassis-protection statement.....	577	
multicast-dlci statement.....	578	
multicast-only statement.....	578	
usage guidelines.....	181	
multicast-router-interface statement.....	579	
multicast-statistics		
aggregated Ethernet interfaces.....	579	
aggregated SONET interfaces.....	579	
multicast-vci statement.....	580	
multilink-max-classes statement.....	581	
multipoint connections.....	165	
multipoint statement.....	581	
usage guidelines.....	165	
multipoint-destination statement.....	582	
Multiprotocol Label Switching See MPLS		
multiservice-options statement.....	583	
usage guidelines.....	147	
N		
n391 statement.....	584	
n392 statement.....	585	
n393 statement.....	586	
name-format statement.....	587	
names.....	59	
of interfaces.....	48	
native-vlan-id statement.....	588	
nbp-max-conf-req statement.....	589	
nbp-restart-timer statement.....	589	
usage guidelines.....	170	
negotiate-address statement.....	590	
usage guidelines.....	188	
negotiating IP addresses		
IPCP.....	188	
negotiation-options		
allow-remote-loopback statement.....	317	
no-allow-link-events statement.....	591	
negotiation-options statement.....	590	
neighbor statement.....	591	
no unidirectional statement.....	769	
no-allow-link-events statement.....	591	
no-asynchronous-notification statement.....	321	
no-auto-mdix statement.....	592	
no-cbit-parity statement.....	352	
no-core-dump statement.....	373	
usage guidelines.....	147	
no-feac-loop-respond statement.....	447	
no-flow-control statement.....	449	
no-gratuitous-arp-reply statement.....	462	
no-gratuitous-arp-request statement.....	592	
no-keepalives statement.....	593	
usage guidelines.....	136	
no-long-buildout statement.....	546	
no-loop-timing statement.....	547	
no-loopback statement.....	550	
no-mac-learn-enable statement.....	558	
no-partition statement.....	594	
no-payload-scrambler statement.....	623	
no-redirects statement.....	595	
usage guidelines.....	196	
no-source-filtering statement.....	715	
no-syslog statement.....	732	
usage guidelines.....	147	
no-termination-request statement.....	596	
no-translate-discard-eligible statement.....	759	
no-translate-fecn-and-becn statement.....	759	
no-traps statement.....	763	
usage guidelines.....	148, 167	
no-unframed statement.....	769	
no-z0-increment statement.....	812	
non-revertive statement.....	597	
nonconfigurable interfaces.....	28	
notice icons defined.....	xxxviii	

O

OAM cells See keepalives	
oam statement.....	598
oam-liveness statement.....	600
oam-period statement.....	601
oc-slice statement.....	602
oc12	
physical part of interface name.....	49
oc3	
physical part of interface name.....	49
oc48	
physical part of interface name.....	49
open-timeout statement.....	602
operating-mode statement.....	603
optics-options statement.....	604
alarm.....	316
warning.....	806
option-82 statement	
stacked vlan ranges.....	605
vlan ranges.....	605
otn-options statement.....	606
output option	
firewall filters.....	208
policers.....	199
output statement.....	608
output-list statement.....	609
usage guidelines.....	208
output-policer statement.....	609
output-priority-map statement.....	610
output-three-color statement.....	610
output-vlan-map statement.....	611
Aggregated Ethernet.....	611
Gigabit Ethernet IQ.....	612
overflow option.....	138
overflow statement.....	613
receive bucket.....	613
transmit bucket.....	613
usage guidelines.....	138
override statement	
stacked VLAN ranges.....	614
VLAN ranges.....	614

P

pado-advertise statement.....	614
paired-group statement.....	615
PAP	
configuring default PAP password.....	172
pap statement.....	616
pap-password statement.....	617

parentheses, in syntax descriptions.....	xl
partition statement.....	618
passive access, configuring.....	123, 126, 173
passive statement.....	619
CHAP.....	619
PAP.....	620
usage guidelines.....	121, 124
passive-monitor-mode statement.....	620
password statement	
stacked vlan ranges.....	621
vlan ranges.....	621
path-database-size statement.....	621
path-trace statement.....	622
payload-scrambler statement.....	623
payload-size statement.....	624
pd	
physical part of interface name.....	49
pdu-interval statement.....	624
pdu-threshold statement.....	625
pe	
physical part of interface name.....	49
peer statement.....	626
peer-unit statement.....	627
per-unit-scheduler statement.....	628
performance-monitoring statement.....	629
periodic statement.....	630
permanent interfaces.....	28, 29
pfc statement.....	630
usage guidelines.....	130
physical interfaces.....	65
accounting profiles.....	140
example configuration.....	140
byte encoding.....	346
C-bit parity mode.....	352
clock rates.....	280
clock sources.....	63, 137, 360
clocking mode.....	280
configuration statements.....	65
DCE.....	380
descriptive text.....	104, 392
descriptors.....	47
disabling.....	149
DTR circuit.....	284
dynamic VLANs.....	327
encapsulation.....	116
idle cycle flag.....	281
keepalives.....	136
leaky bucket properties.....	138
line encoding.....	287

line protocol.....	275
link modes.....	106
loopback capability	
serial interfaces.....	285
media MTU size.....	106
mixed VLAN tagging.....	449, 588
physical interface properties.....	65
PPP CHAP.....	121, 124
signal polarity.....	284
SNMP notifications.....	148
speed.....	132, 133, 134
statements.....	75
transitions, damping.....	147
unidirectional mode	
unidirectional link mode.....	148
VLAN tagging.....	797
<i>See also</i> names of specific interfaces	
physical part of interface name.....	49
pic-type statement.....	631
pimd	
physical part of interface name.....	49
pime	
physical part of interface name.....	49
plp-to-clp statement.....	631
plp1 statement.....	632
point-to-point connections	
logical interfaces.....	164
unnumbered Ethernet interfaces.....	190
Point-to-Point Protocol encapsulation.....	116
encapsulation overhead.....	114
keepalives.....	136
on physical interfaces.....	116
PPP CHAP.....	121, 124
point-to-point statement.....	633
usage guidelines.....	164
policer	
interface.....	638
policer statement	
CFM firewall.....	634
CFM global level.....	635
CFM session level.....	636
CoS.....	637
interface MAC.....	639
usage guidelines.....	199
policers	
applying.....	199
arp option.....	199
burst-size-limit	
statement.....	199
input option.....	199
logical interfaces.....	199
output option.....	199
pool statement.....	640
pop statement	
Gigabit Ethernet IQ interfaces.....	641
pop-all-labels statement.....	642
pop-pop statement	
Gigabit Ethernet IQ interfaces.....	643
pop-swap statement	
Gigabit Ethernet IQ interfaces.....	643
port statement	
voice services.....	644
port-priority statement	
LACP.....	644
port-status-tlv statement.....	645
post-service-filter statement.....	645
PPP	
address and control field compression.....	129
dynamic-profile.....	171
PPP clear loopback detected timer.....	170
protocol field compression.....	130
restart timer.....	170
PPP properties, assigning	
IPCP.....	189
ppp-options statement.....	646
lcp-max-conf-req.....	520
ncp-max-conf-req.....	589
usage guidelines.....	121, 124
PPPD processes, trace operations.....	128
pppoe-options statement.....	647
pppoe-underlying-options statement	
static and dynamic PPPoE.....	648
preferred interface addresses.....	197, 198
preferred statement.....	649
usage guidelines.....	183, 198
preferred-source-address statement.....	650
example.....	194
usage guidelines.....	192
premium	
policer.....	652
premium statement	
hierarchical policer.....	651
output priority map.....	652
preserve-interface statement.....	653
primary interface addresses.....	197, 198
primary router addresses.....	197
primary router interfaces.....	197

- primary statement.....654
 - address for interface
 - usage guidelines.....198
 - address on interface.....654
 - AS PIC or Multiservices PIC interfaces.....654
 - interface for router
 - usage guidelines.....197
 - priority
 - schedulers.....656
 - priority statement.....655
 - CFM SLA iterator.....656
 - OAM connectivity-fault management.....655
 - promiscuous-mode statement.....657
 - protect-circuit statement.....657
 - protection-group statement.....658
 - protocol families
 - configuration statements.....177
 - logical interfaces.....177, 180
 - protocol MTUs.....195
 - unnumbered interfaces.....190
 - protocol field compression.....130
 - protocol MTUs.....106
 - logical interfaces.....195
 - See also MTU
 - protocol redirect messages.....196
 - protocol-down statement.....659
 - protocols
 - families.....177
 - line.....275
 - protocols statement.....659
 - proxy statement.....660
 - proxy-arp statement.....661
 - push statement
 - Gigabit Ethernet IQ interfaces.....662
 - push-push statement
 - Gigabit Ethernet IQ interfaces.....662
- Q**
- queue-depth statement.....663
 - queue-length statement.....664
 - queues statement.....664
 - quiet-period statement.....665
- R**
- radius-realm statement
 - stacked vlan ranges.....665
 - vlan ranges.....665
 - ranges statement
 - stacked VLAN.....666
 - VLAN.....667
 - rate statement.....667, 668
 - usage guidelines.....138
 - reassemble-packets statement.....668
 - reauthentication statement.....669
 - rebalance-periodic statement
 - aggregated Ethernet.....669
 - receive (tracing flag modifier).....146
 - receive-bucket statement.....670
 - usage guidelines.....138
 - receive-options-packets statement.....670
 - receive-ttl-exceeded statement.....671
 - red-differential-delay statement.....671
 - redial-delay statement.....672
 - redirect messages.....196
 - redundancy-options statement.....673
 - remote statement.....674
 - remote-loopback statement.....674
 - remote-loopback-respond statement.....675
 - remote-mep statement.....676
 - request statement.....676
 - required-depth statement.....677
 - retries statement.....678
 - revert-time statement.....679
 - revertive statement.....679
 - rfc-2615 statement.....680
 - ring-protection-link-end statement.....680
 - ring-protection-link-owner statement.....681
 - rlsq
 - physical part of interface name.....49
 - rms
 - physical part of interface name.....49
 - routers
 - default addresses.....197
 - primary addresses.....197
 - primary interfaces.....197
 - routing matrix
 - chassis, interface naming.....59
 - interface naming.....54, 56
 - routing-instance statement.....681
 - PPPoE service name tables.....682
 - rpf-check statement.....683
 - usage guidelines.....212
 - rsp
 - physical part of interface name.....49
 - rtp statement.....684

rts statement.....	684
usage guidelines.....	281
rts-polarity statement.....	685
usage guidelines.....	284
rtvbr statement.....	686

S

sa-multicast statement.....	687
sampling statement.....	687
satop-options	
payload-size.....	624
satop-options statement.....	688
SCC.....	54
scheduler-maps statement.....	689
schedulers statement.....	689
SDH interfaces	
MTU sizes.....	107, 108, 109
se	
physical part of interface name.....	49
secondary statement.....	690
send (tracing flag modifier).....	146
send-critical-event statement.....	690
separators, in interface names.....	53
serial interfaces	
clock rates.....	280
clocking mode.....	279, 280
configuration statements.....	273
control leads.....	281
correcting phase shift.....	280
default settings.....	276
DTR circuit.....	284
idle cycle flag.....	281
invalid statements.....	277
line encoding.....	287
line protocol.....	275
loopback capability.....	285
physical interface properties.....	273
signal polarity.....	284
serial-options statement.....	691
usage guidelines.....	273
server statement.....	692
server-timeout statement.....	692
service statement.....	693
logical interfaces.....	693
PPPoE.....	694
service-domain statement.....	695
service-filter statement.....	696
service-name statement.....	696

service-name-table statement	
PPPoE underlying interface.....	697
service-name-tables statement	
PPPoE.....	698
service-set statement.....	699
services interfaces.....	33
services statement.....	700
services-options statement.....	701
session-limit statement.....	702
SFC.....	56
shaping statement.....	703
shdsl-options statement.....	704
short-name-format statement.....	705
short-sequence statement.....	705
signal polarity, serial interfaces.....	284
sla-iterator-profile statement.....	706
sla-iterator-profiles statement.....	707
snext statement.....	708
snr-margin statement.....	709
so	
physical part of interface name.....	49
SONET interfaces	
clock sources.....	137
encapsulation.....	116
MTU sizes.....	107, 108, 109
sonet-options statement.....	710
SONET/SDH interfaces	
interface speed.....	134
source statement.....	712
source-address-filter statement.....	713
source-class usage	
example configuration.....	221
source-class-usage statement.....	714
usage guidelines.....	218
source-filtering statement.....	715
sp	
physical part of interface name.....	49
speed statement	
Ethernet.....	716
MX Series DPC.....	717
SONET/SDH.....	718
usage guidelines.....	132, 133, 134
spid1 statement.....	718
spid2 statement.....	719
stacked VLAN-tag framing	
VLAN ID list.....	801
stacked-vlan-ranges statement.....	720
stacked-vlan-tagging statement.....	721
start-end-flag statement.....	722

- static PPPoE statements
 - pppoe-underlying-options.....648
 - static routes
 - unnumbered Ethernet interfaces.....193
 - static subscribers
 - pppoe-underlying-options statement.....648
 - static-interface statement
 - PPPoE.....723
 - static-tei-val statement.....724
 - stm1
 - physical part of interface name.....49
 - stm16
 - physical part of interface name.....49
 - stm4
 - physical part of interface name.....49
 - subscriber interface statements
 - access-concentrator.....294
 - pppoe-underlying-options.....648
 - supplicant statement
 - single (mode).....724
 - supplicant-timeout statement.....725
 - support, technical See technical support
 - swap statement
 - Gigabit Ethernet IQ interfaces.....725
 - swap-push statement
 - Gigabit Ethernet IQ interfaces.....726
 - swap-swap statement
 - Gigabit Ethernet IQ interfaces.....726
 - switch-card chassis SCC.....54
 - switch-fabric chassis SFC.....56
 - switch-options statement.....727
 - switch-port statement
 - access switching.....728
 - switch-type statement.....729
 - switching-mode statement.....730
 - symbol-period statement.....731
 - Synchronous Ethernet
 - overview.....62
 - syntax conventions.....xxxix
 - syslog statement.....732
 - usage guidelines.....147
 - system-priority statement
 - LACP.....734
- T**
- t1
 - physical part of interface name.....49
 - T1 interfaces
 - byte encoding.....346
 - MTU sizes.....107, 108
 - t1-options statement.....735
 - T1600 routers
 - configured in a routing matrix.....56
 - t3
 - physical part of interface name.....49
 - T3 interfaces
 - C-bit parity mode.....352
 - encapsulation.....116
 - MTU sizes.....107, 108
 - t3-options statement.....738
 - t310 statement.....736
 - t391 statement.....736
 - t392 statement.....737
 - T640 routers.....54
 - tag-protocol-id statement.....739
 - TPID to rewrite.....740
 - TPIDs expected to be sent or received.....739
 - tap
 - physical part of interface name.....49
 - targeted-broadcast statement.....741
 - targeted-distribution statement
 - aggregated Ethernet.....741
 - TCC.....229
 - encapsulation.....120
 - technical support
 - contacting JTAC.....xl
 - tei-option statement.....742
 - terminate statement
 - PPPoE service name tables.....742
 - then statement
 - hierarchical policer.....743
 - threshold statement.....743
 - usage guidelines.....138
 - timeslots statement.....744
 - tm statement.....745
 - usage guidelines.....281
 - tm-polarity statement.....745
 - usage guidelines.....284
 - traceoptions statement.....746
 - ICCP.....747
 - interface processes.....750
 - interfaces.....748
 - usage guidelines.....146
 - LACP.....752
 - PPPD.....754

PPPD processes	
usage guidelines.....	128
PPPoE.....	757
tracing flags	
all.....	146
event.....	146
ipc.....	146
media.....	146
tracing operations	
PPPD.....	128
transient interfaces.....	28, 32
transitions	
damping.....	147
translate-discard-eligible statement.....	759
translate-fecn-and-becn statement.....	759
translational cross-connect See TCC	
translational cross-connect encapsulation See TCC,	
encapsulation	
transmit clock sources.....	137
transmit-bucket statement.....	760
usage guidelines.....	138
transmit-clock statement.....	760
usage guidelines.....	280
transmit-period statement.....	761
transmit-weight statement.....	762
ATM2 IQ CoS Forwarding Class.....	762
ATM2 IQ Virtual Circuit.....	763
traps statement.....	763
usage guidelines.....	148, 167
Tri-Rate Ethernet interfaces	
interface speed.....	133
trigger statement.....	764
trigger-link-failure statement.....	765
Trivial Network Protocol family	
interface addresses.....	182
on logical interfaces.....	180
trunk interface.....	499
trunk port.....	499
VLAN ID list.....	792
trunk-bandwidth statement.....	765
trunk-id statement.....	766
ttl statement.....	766
tunnel statement.....	767
TX Matrix Plus router	
interface naming.....	56
chassis.....	59
TX Matrix router	
interface naming.....	54
chassis.....	59

U

umd	
physical part of interface name.....	49
underlying interfaces	
specifying family type for.....	262
underlying-interface statement.....	768
unframed statement.....	769
unicast RPF.....	212
example configuration.....	217
fail filters.....	216, 217
loose mode.....	214
routing asymmetry.....	216
strict mode.....	213
VPNs.....	216
example configuration.....	216
unidirectional link mode.....	148
unidirectional statement.....	769
unit numbers.....	162
unit statement.....	770
logical interfaces	
usage guidelines.....	151, 162
unnumbered interfaces	
demux.....	191
Ethernet.....	191
preferred source address.....	650
IPCP.....	189
point-to-point.....	190
unnumbered-address statement.....	777
demux interface.....	777
Ethernet.....	778
PPP.....	779
preferred source address	
usage guidelines.....	192
usage guidelines.....	189, 191
unnumbered-interface statement	
usage guidelines.....	189
up-count statement.....	780
USB modem	
configuring.....	102
user-prefix statement	
stacked vlan ranges.....	781
vlan ranges.....	781
username-include statement	
stacked vlan ranges.....	782
vlan ranges.....	782

V

vbr statement.....	783
vc-cos-mode statement.....	784

vc4	
physical part of interface name.....	49
vci statement.....	785
vci-range statement.....	786
virtual-switch statement.....	786
VLAN CCC encapsulation	
encapsulation overhead.....	114
physical interfaces.....	116
VLAN IDs.....	793
VLAN tagging.....	797
vlan-id statement.....	787
802.1Q VLANs.....	788
ATM-to-Ethernet cross-connect.....	788
Ethernet interfaces.....	788
interface in bridge domain.....	787
rewriting at ingress or egress.....	789
vlan-id-list.....	790
vlan-id-list statement	
bridge domain.....	792
Ethernet VLAN circuit.....	791
vlan-id-range statement.....	793
Ethernet interfaces.....	793
vlan-ranges statement.....	794
vlan-rewrite statement.....	795
vlan-rule statement.....	795
vlan-steering statement.....	796
vlan-tagging statement.....	797
vlan-tags statement	
dual-tag framing.....	799
stacked VLAN tags.....	801
vlan-tags-outer statement.....	802
vlan-vci-ccc encapsulation	
ATM-to-Ethernet interworking.....	236
vlan-vci-tagging statement.....	802
ATM-to-Ethernet interworking.....	236
VLANs	
configuring VLAN ranges.....	720, 794
voice over IP	
dynamic CAC.....	175
vpi statement.....	803
ATM CCC cell-relay promiscuous mode.....	803
Logical Interface and Interworking.....	805
virtual path.....	804
vpls protocol family	
interface addresses.....	182
on logical interfaces.....	180
VPNs	
unicast RPF.....	216
vrrp	
failover-delay.....	440
vsp	
physical part of interface name.....	49
vt	
physical part of interface name.....	49
vtmapping statement.....	805
W	
warning statement.....	806
watch-list statement.....	806
wavelength statement.....	807
west-interface statement.....	810
working-circuit statement.....	811
X	
xe	
physical part of interface name.....	49
xt	
physical part of interface name.....	49
Y	
yellow-differential-delay statement.....	811
Z	
z0-increment statement.....	812

Index of Statements and Commands

Symbols

802.3ad statement.....291

A

accept statement.....292
 accept-source-mac statement.....293
 access-concentrator statement.....294
 access-profile statement.....295
 accounting statement.....296
 accounting-profile statement.....296
 acfc statement.....297
 acknowledge-retries statement.....298
 acknowledge-timer statement.....299
 action statement
 OAM.....300
 policer.....300
 action-profile statement
 applying to remote MEP.....301
 CFM.....302
 LFM.....303
 action-red-differential-delay statement.....304
 activation-delay statement.....304
 activation-priority statement.....305
 address statement.....306
 advertise-interval statement.....307
 age statement.....308
 agent-specifier statement
 PPPoE.....309
 aggregate statement.....311
 hierarchical policer.....312
 aggregate-ports statement.....313
 aggregated Ethernet
 targeted distribution of
 subscribers.....544, 669, 741
 aggregated-ether-options statement.....314
 aggregated-sonet-options statement.....315
 alarm statement.....316
 allow-any-vci statement.....316
 allow-fragmentation statement.....317
 allow-remote-loopback statement.....317

annex statement.....318
 aps statement.....319
 annex-b.....318
 arp statement.....320
 asynchronous-notification statement.....321
 atm-encapsulation statement.....321
 atm-options statement.....322
 atm-scheduler-map statement323
 authentication statement
 stacked vlan ranges.....324
 vlan ranges.....324
 authentication-key statement.....325
 authentication-profile-name statement.....325
 authenticator statement.....326
 auto-configure statement.....327
 auto-discovery statement.....328
 auto-negotiation statement
 Gigabit Ethernet.....329
 auto-reconnect statement.....330

B

backup-destination statement.....330
 backup-interface statement.....331
 backup-options statement.....331
 bandwidth statement.....332
 bandwidth-limit statement
 hierarchical policer.....333
 policer for Gigabit Ethernet interface.....334
 bchannel-allocation statement.....334
 bearer-bandwidth-limit statement.....335
 bert-algorithm statement.....336
 bert-error-rate statement.....338
 bert-period statement.....339
 bridge-domain statement.....340
 broadcast statement.....341
 buildout statement
 E3 or T3 over ATM interfaces.....342
 T1 interfaces.....343
 bundle statement.....344

burst-size-limit statement	
hierarchical policer.....	345
policer for Gigabit Ethernet interface.....	345
byte-encoding statement.....	346
bytes statement.....	347

C

calculation-weight statement.....	348
callback statement.....	349
callback-wait-period statement.....	350
caller statement.....	351
calling-number statement.....	352
cbit-parity statement.....	352
cbr statement.....	353
cell-bundle-size statement.....	354
chap statement.....	355
chap-secret statement.....	356
circuit-type statement	
stacked vlan ranges.....	356
vlan ranges.....	356
cisco-interoperability statement.....	357
classifier statement.....	357
clear-dont-fragment-bit statement.....	358
client statement.....	358
clock-rate statement.....	359
clocking statement.....	360
clocking-mode statement.....	361
compatibility-mode statement.....	362
compression statement.....	363
compression-device statement.....	364
connections statement.....	365
connectivity-fault-management statement.....	366
container-devices statement.....	368
device-count.....	368
container-list statement.....	368
container-options statement.....	369
container-type statement.....	369
continuity-check statement.....	370
control-channel statement.....	371
control-polarity statement.....	371
control-signal statement.....	372
copy-tos-to-outer-ip-header statement.....	372
core-dump statement.....	373
crc-major-alarm-threshold statement.....	373
crc-minor-alarm-threshold statement.....	374
cts statement.....	374
cts-polarity statement.....	375
current statement.....	375
cycle-time statement.....	376

D

data-channel statement.....	376
data-input statement.....	377
data-tlv-size statement.....	378
dcd statement.....	379
dcd-polarity statement.....	379
dce statement.....	380
dce-options statement.....	380
deactivation-delay statement.....	381
default-actions statement.....	381
default-chap-secret statement.....	382
default-pap-password statement.....	382
delay statement.....	384
PPPoE service name tables.....	383
delay-variation statement.....	385
delegate-server-processing statement.....	385
delimiter statement	
stacked vlan ranges.....	386
vlan ranges.....	386
demux-destination statement.....	387
demux interfaces.....	388
demux-options statement.....	388
demux-source statement.....	389, 390
demux interfaces.....	389
demux0 statement.....	391
description statement.....	392
destination statement.....	393
destination-class-usage statement.....	395
destination-profile statement.....	395
dial-options statement.....	396
dial-string statement.....	396
dialer statement.....	397
dialer-options statement.....	398
dialin statement.....	399
direction statement.....	399
disable statement.....	400
link protection.....	401
disable-mlppp-inner-ppp-pfc statement.....	401
dlci statement.....	402
do-not-fragment statement.....	403
domain-name statement	
DHCP relay agent.....	404

dot1x statement.....	405
authenticator.....	405
authentication-profile-name.....	405
interface.....	405
<i>See also</i> maximum-requests	
<i>See also</i> quiet-period	
<i>See also</i> reauthentication	
<i>See also</i> retries	
<i>See also</i> server-timeout	
<i>See also</i> supplicant	
<i>See also</i> supplicant-timeout	
<i>See also</i> transmit-period	
down-count statement.....	406
drop statement	
PPPoE service name tables.....	407
drop-timeout statement.....	407
ds0-options statement.....	408
dsl-options statement.....	408
dsr statement.....	409
dsr-polarity statement.....	409
dte-options statement.....	410
dtr statement.....	411
dtr-circuit statement.....	412
dtr-polarity statement.....	412
dump-on-flow-control statement.....	413
dynamic PPPoE statements	
pppoe-underlying-options.....	648
dynamic-call-admission-control statement.....	414
dynamic-profile statement	
PPPoE service name tables.....	415
stacked VLAN ranges.....	416
VLAN ranges.....	416

E

e1-options statement.....	417
e3-options statement.....	418
east-interface statement.....	419
encapsulation statement.....	420
container interface.....	420
logical interface.....	421
physical interface.....	424
encoding statement.....	427
epd-threshold statement.....	428
logical interface.....	428
physical interface.....	429
es-options statement.....	429
ethernet statement.....	430
ethernet-policer-profile statement.....	433
ethernet-ring statement.....	434

ethernet-switch-profile statement.....	435
eui-64 statement.....	436
evcs statement.....	437
event statement.....	438
interface-status-tlv statement.....	504
port-status-tlv statement.....	645
event-thresholds statement.....	438

F

f-max-period statement.....	439
facility-override statement.....	439
failover-delay statement.....	440
family statement.....	441
fastether-options statement.....	445
fcs statement.....	446
feac-loop-respond statement.....	447
filter statement.....	448
firewall	
hierarchical-policer.....	465
flexible-vlan-tagging statement.....	449
flow-control statement.....	449
flow-control-options statement.....	450
force statement.....	450
forward-and-send-to-re statement.....	451
forward-only statement.....	451
forwarding-class statement.....	452
forwarding-mode statement.....	453
fragment-threshold statement.....	454
frame-error statement.....	455
frame-period statement.....	456
frame-period-summary statement.....	457
framing statement.....	458
10-Gigabit Ethernet interfaces.....	460
E1, E3, and T1 interfaces.....	459
SONET and SDH interfaces.....	460

G

gigether-options statement.....	461
gratuitous-arp-reply statement.....	462
guard-interval statement.....	463

H

hardware-assisted-timestamping statement.....	463
hello-timer statement.....	464
hierarchical-policer statement.....	465
hierarchical-schedulers statement.....	466
high-plp-max-threshold statement.....	466
high-plp-threshold statement.....	467

hold-interval statement	
connectivity-fault management.....	468
Ethernet ring protection switching.....	468
hold-time statement.....	469
APS.....	469
Physical Interface.....	470
SONET/SDH Defect Triggers.....	471
host statement.....	472

I

idle-cycle-flag statement.....	473
idle-timeout statement.....	474
ieee802.1p statement.....	474
if-exceeding statement	
hierarchical policer.....	475
igmp-snooping statement.....	476
ignore statement.....	477
ignore-all statement.....	477
ignore-l3-incompletes statement.....	478
ilmi statement.....	478
ima-group-options statement.....	479
ima-link-options statement.....	480
inactivity-timeout statement.....	481
incoming-called-number statement.....	481
incoming-map statement.....	482
indication statement.....	483
indication-polarity statement.....	483
ingress-rate-limit statement.....	484
init-command-string statement.....	485
initial-route-check statement.....	486
inner-tag-protocol-id statement.....	487
inner-vlan-id statement.....	488
inner-vlan-id-range statement.....	489
input statement.....	489
input-list statement.....	490
input-policer statement.....	490
input-priority-map statement.....	491
input-three-color statement.....	491
input-vlan-map statement.....	492
instance statement.....	493
interface statement.....	494
CoS.....	494
IEEE 802.1ag.....	496
IEEE 802.1X.....	495
IEEE 802.3ah.....	497
interface-down statement.....	381, 498
interface-mode statement.....	499

interface-name statement	
stacked vlan ranges.....	500
vlan ranges.....	500
interface-range statement.....	501
interface-set statement.....	503
interface-status-tlv statement.....	504
interface-switch statement.....	505
interface-type statement.....	506
interfaces	
interface-range.....	501
interfaces statement.....	507
interleave-fragments statement.....	507
interval statement.....	508
inverse-arp statement.....	509
invert-data statement.....	510
ipsec-sa statement.....	511
isdn-options statement.....	512
iteration-count statement.....	513
iteration-period statement.....	513

K

keep-address-and-control statement.....	514
keepalives statement.....	515
key statement.....	516

L

l2tp-interface-id statement.....	516
lACP statement	
802.3ad.....	517
Aggregated Ethernet.....	518
layer2-policer statement.....	519
lcp-max-conf-req statement.....	520
lcp-restart-timer statement.....	520
level statement.....	521
line-encoding statement.....	522
line-protocol statement.....	523
line-rate statement.....	523
linear-red-profile statement.....	524
linear-red-profiles statement.....	525
link-adjacency-loss statement.....	525
link-discovery statement.....	526
link-down statement.....	526
link-event-rate statement.....	527
link-fault-management statement.....	528
link-layer-overhead statement.....	529
link-mode statement.....	530
link-protection statement.....	531
link-speed statement.....	532
linktrace statement.....	534

lmi statement	
Ethernet OAM.....	538
Frame Relay keepalives.....	536
lmi-type statement.....	539
load-interval statement.....	540
load-threshold statement.....	541
local-name statement.....	542
local-password statement.....	543
lockout statement.....	543
log-prefix statement.....	544
logical-interface-fpc-redundancy statement	
aggregated Ethernet.....	544
logical-interface-policer statement.....	545
logical-systems statement.....	545
long-buildout statement.....	546
loop-timing statement.....	547
loopback statement.....	548
ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and	
T1/T3.....	549
Aggregated Ethernet, Fast Ethernet, and Gigabit	
Ethernet.....	550
no-loopback.....	548
serial.....	551
loopback-clear-timer statement.....	552
loss-priority statement.....	552
loss-threshold statement.....	553
low-plp-max-threshold statement.....	553
low-plp-threshold statement.....	554
lowest-priority-defect statement.....	555
lsq-failure-options statement.....	556
M	
mac statement.....	556
mac-address statement.....	557
Accept Source Mac.....	557
stacked vlan ranges.....	557
vlan ranges.....	557
mac-learn-enable statement.....	558
mac-validate statement.....	559
maintenance-association statement.....	560
maintenance-domain statement.....	561
mip-half-function.....	571
virtual-switch.....	786
master-only statement.....	562
max-sessions statement	
PPPoE service name tables.....	565
maximum-contexts statement.....	563
maximum-requests statement.....	563
maximum-vcs statement.....	564
mc-ae statement.....	566
measurement-type statement.....	567
member-interface-speed statement.....	567
member-interface-type statement.....	568
mep statement.....	569
minimum-links statement.....	570
mip-half-function statement.....	571
mlfr-uni-nni-bundle-options statement.....	572
mode statement.....	573
modem-options statement.....	573
monitor-session statement.....	574
mpls statement.....	574
mrru statement.....	575
mtu statement.....	576
multi-chassis-protection	
peer statement.....	626
multi-chassis-protection statement.....	577
multicast-dlci statement.....	578
multicast-only statement.....	578
multicast-router-interface statement.....	579
multicast-statistics	
aggregated Ethernet interfaces.....	579
aggregated SONET interfaces.....	579
multicast-vci statement.....	580
multilink-max-classes statement.....	581
multipoint statement.....	581
multipoint-destination statement.....	582
multiservice-options statement.....	583
N	
n391 statement.....	584
n392 statement.....	585
n393 statement.....	586
name-format statement.....	587
native-vlan-id statement.....	588
ncp-max-conf-req statement.....	589
ncp-restart-timer statement.....	589
negotiate-address statement.....	590
negotiation-options statement.....	590
neighbor statement.....	591
no-allow-link-events statement.....	591
no-asynchronous-notification statement.....	321
no-auto-mdix statement.....	592
no-cbit-parity statement.....	352
no-core-dump statement.....	373
no-feac-loop-respond statement.....	447
no-flow-control statement.....	449
no-gratuitous-arp-reply statement.....	462
no-gratuitous-arp-request statement.....	592

no-keepalives statement.....	593
no-long-buildout statement.....	546
no-loop-timing statement.....	547
no-loopback statement.....	550
no-mac-learn-enable statement.....	558
no-partition statement.....	594
no-payload-scrambler statement.....	623
no-redirects statement.....	595
no-source-filtering statement.....	715
no-syslog statement.....	732
no-termination-request statement.....	596
no-translate-discard-eligible statement.....	759
no-translate-fecn-and-becn statement.....	759
no-unframed statement.....	769
no-z0-increment statement.....	812
non-revertive statement.....	597

O

oam statement.....	598
oam-liveness statement.....	600
oam-period statement.....	601
oc-slice statement.....	602
open-timeout statement.....	602
operating-mode statement.....	603
optics-options statement.....	604
alarm.....	316
warning.....	806
option-82 statement	
stacked vlan ranges.....	605
vlan ranges.....	605
otn-options statement.....	606
output statement.....	608
output-list statement.....	609
output-policer statement.....	609
output-priority-map statement.....	610
output-three-color statement.....	610
output-vlan-map statement.....	611
Aggregated Ethernet.....	611
Gigabit Ethernet IQ.....	612
overflow statement.....	613
receive bucket.....	613
transmit bucket.....	613
override statement	
stacked VLAN ranges.....	614
VLAN ranges.....	614

P

pado-advertise statement.....	614
paired-group statement.....	615

pap statement.....	616
pap-password statement.....	617
partition statement.....	618
passive statement.....	619
CHAP.....	619
PAP.....	620
passive-monitor-mode statement.....	620
password statement	
stacked vlan ranges.....	621
vlan ranges.....	621
path-database-size statement.....	621
path-trace statement.....	622
payload-scrambler statement.....	623
payload-size statement.....	624
pdu-interval statement.....	624
pdu-threshold statement.....	625
peer statement.....	626
peer-unit statement.....	627
per-unit-scheduler statement.....	628
performance-monitoring statement.....	629
periodic statement.....	630
pfc statement.....	630
pic-type statement.....	631
plp-to-clp statement.....	631
plp1 statement.....	632
point-to-point statement.....	633
policer	
interface.....	638
policer statement	
CFM firewall.....	634
CFM global level.....	635
CFM session level.....	636
CoS.....	637
interface MAC.....	639
pool statement.....	640
pop statement	
Gigabit Ethernet IQ interfaces.....	641
pop-all-labels statement.....	642
pop-pop statement	
Gigabit Ethernet IQ interfaces.....	643
pop-swap statement	
Gigabit Ethernet IQ interfaces.....	643
port statement	
voice services.....	644
port-priority statement	
LACP.....	644
port-status-tlv statement.....	645
post-service-filter statement.....	645

ppp-options statement.....	646	reauthentication statement.....	669
lcp-max-conf-req.....	520	rebalance-periodic statement	
ncp-max-conf-req.....	589	aggregated Ethernet.....	669
pppoe-options statement.....	647	receive-bucket statement.....	670
pppoe-underlying-options statement		receive-options-packets statement.....	670
static and dynamic PPPoE.....	648	receive-ttl-exceeded statement.....	671
preferred statement.....	649	red-differential-delay statement.....	671
preferred-source-address statement.....	650	redial-delay statement.....	672
premium		redundancy-options statement.....	673
policer.....	652	remote statement.....	674
premium statement		remote-loopback statement.....	674
hierarchical policer.....	651	remote-loopback-respond statement.....	675
output priority map.....	652	remote-mep statement.....	676
preserve-interface statement.....	653	request statement.....	676
primary statement.....	654	required-depth statement.....	677
address on interface.....	654	retries statement.....	678
AS PIC or Multiservices PIC interfaces.....	654	revert-time statement.....	679
priority		revertive statement.....	679
schedulers.....	656	rfc-2615 statement.....	680
priority statement.....	655	ring-protection-link-end statement.....	680
CFM SLA iterator.....	656	ring-protection-link-owner statement.....	681
OAM connectivity-fault management.....	655	routing-instance statement.....	681
promiscuous-mode statement.....	657	PPPoE service name tables.....	682
protect-circuit statement.....	657	rpf-check statement.....	683
protection-group statement.....	658	rtp statement.....	684
protocol-down statement.....	659	rts statement.....	684
protocols statement.....	659	rts-polarity statement.....	685
proxy statement.....	660	rtvbr statement.....	686
proxy-arp statement.....	661		
push statement		S	
Gigabit Ethernet IQ interfaces.....	662	sa-multicast statement.....	687
push-push statement		sampling statement.....	687
Gigabit Ethernet IQ interfaces.....	662	satop-options statement.....	688
		scheduler-maps statement.....	689
Q		schedulers statement.....	689
queue-depth statement.....	663	secondary statement.....	690
queue-length statement.....	664	send-critical-event statement.....	690
queues statement.....	664	serial-options statement.....	691
quiet-period statement.....	665	server statement.....	692
		server-timeout statement.....	692
R		service statement.....	693
radius-realm statement		logical interfaces.....	693
stacked vlan ranges.....	665	PPPoE.....	694
vlan ranges.....	665	service-domain statement.....	695
ranges statement		service-filter statement.....	696
stacked VLAN.....	666	service-name statement.....	696
VLAN.....	667	service-name-table statement	
rate statement.....	667, 668	PPPoE underlying interface.....	697
reassemble-packets statement.....	668		

service-name-tables statement		switching-mode statement.....	730
PPPoE.....	698	symbol-period statement.....	731
service-set statement.....	699	syslog statement.....	732
services statement.....	700	system-priority statement	
services-options statement.....	701	LACP.....	734
session-limit statement.....	702		
shaping statement.....	703	T	
shdsl-options statement.....	704	t1-options statement.....	735
short-name-format statement.....	705	t3-options statement.....	738
short-sequence statement.....	705	t310 statement.....	736
sla-iterator-profile statement.....	706	t391 statement.....	736
sla-iterator-profiles statement.....	707	t392 statement.....	737
snext statement.....	708	tag-protocol-id statement.....	739
snr-margin statement.....	709	TPID to rewrite.....	740
sonet-options statement.....	710	TPIDs expected to be sent or received.....	739
source statement.....	712	targeted-broadcast statement.....	741
source-address-filter statement.....	713	targeted-distribution statement	
source-class-usage statement.....	714	aggregated Ethernet.....	741
source-filtering statement.....	715	tei-option statement.....	742
speed statement		terminate statement	
Ethernet.....	716	PPPoE service name tables.....	742
MX Series DPC.....	717	then statement	
SONET/SDH.....	718	hierarchical policer.....	743
spid1 statement.....	718	threshold statement.....	743
spid2 statement.....	719	timeslots statement.....	744
stacked-vlan-ranges statement.....	720	tm statement.....	745
stacked-vlan-tagging statement.....	721	tm-polarity statement.....	745
start-end-flag statement.....	722	traceoptions statement.....	746
static PPPoE statements		ICCP.....	747
pppoe-underlying-options.....	648	interface processes.....	750
static-interface statement		interfaces.....	748
PPPoE.....	723	LACP.....	752
static-tei-val statement.....	724	PPPD.....	754
subscriber interface statements		PPPoE.....	757
access-concentrator.....	294	translate-discard-eligible statement.....	759
pppoe-underlying-options.....	648	translate-fecn-and-becn statement.....	759
supplicant statement		transmit-bucket statement.....	760
single (mode).....	724	transmit-clock statement.....	760
supplicant-timeout statement.....	725	transmit-period statement.....	761
swap statement		transmit-weight statement.....	762
Gigabit Ethernet IQ interfaces.....	725	ATM2 IQ CoS Forwarding Class.....	762
swap-push statement		ATM2 IQ Virtual Circuit.....	763
Gigabit Ethernet IQ interfaces.....	726	traps statement.....	763
swap-swap statement		trigger statement.....	764
Gigabit Ethernet IQ interfaces.....	726	trigger-link-failure statement.....	765
switch-options statement.....	727	trunk-bandwidth statement.....	765
switch-port statement		trunk-id statement.....	766
access switching.....	728	ttl statement.....	766
switch-type statement.....	729	tunnel statement.....	767

U

underlying-interface statement.....	768
unframed statement.....	769
unidirectional statement.....	769
unit statement.....	770
unnumbered-address statement.....	777
demux interface.....	777
Ethernet.....	778
PPP.....	779
up-count statement.....	780
user-prefix statement	
stacked vlan ranges.....	781
vlan ranges.....	781
username-include statement	
stacked vlan ranges.....	782
vlan ranges.....	782

V

vbr statement.....	783
vc-cos-mode statement.....	784
vci statement.....	785
vci-range statement.....	786
virtual-switch statement.....	786
vlan-id statement.....	787
802.1Q VLANs.....	788
ATM-to-Ethernet cross-connect.....	788
Ethernet interfaces.....	788
interface in bridge domain.....	787
rewriting at ingress or egress.....	789
vlan-id-list.....	790
vlan-id-list statement	
bridge domain.....	792
Ethernet VLAN circuit.....	791
vlan-id-range statement.....	793
vlan-ranges statement.....	794
vlan-rewrite statement.....	795
vlan-rule statement.....	795
vlan-steering statement.....	796
vlan-tagging statement.....	797
vlan-tags statement	
dual-tag framing.....	799
stacked VLAN tags.....	801
vlan-tags-outer statement.....	802
vlan-vci-tagging statement.....	802
vpi statement.....	803
ATM CCC cell-relay promiscuous mode.....	803
Logical Interface and Interworking.....	805
virtual path.....	804
vtmapping statement.....	805

W

warning statement.....	806
watch-list statement.....	806
wavelength statement.....	807
west-interface statement.....	810
working-circuit statement.....	811

Y

yellow-differential-delay statement.....	811
--	-----

Z

z0-increment statement.....	812
-----------------------------	-----

