

# About This Guide

This preface provides the following guidelines for using *JUNOS<sup>™</sup> Software for E-series<sup>™</sup> Routing Platforms Command Reference Guide A to M*:

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## Objectives

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This guide provides descriptions, syntax, parameter definitions, and release history for the commands in the JUNOS CLI. Refer to the configuration guides for detailed information about configuring an E-series router.

An E-series router is shipped with the latest system software installed. If you need to install a future release or reinstall the system software, refer to the procedures in *JUNOS System Basics Configuration Guide, Chapter 3, Installing JUNOS Software*.



**NOTE:** If the information in the latest *JUNOS Release Notes* differs from the information in this guide, follow the *JUNOS Release Notes*.

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## Audience

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This guide is intended for experienced system and network specialists working with E-series routers in an Internet access environment.

## E-series Routers

Seven models of E-series routers are available:

- E120 router
- E320 router
- ERX-1440 router
- ERX-1410 router
- ERX-710 router
- ERX-705 router
- ERX-310 router

All models use the same software. For information about all models except the E120 router and the E320 router, see *ERX Hardware Guide, Chapter 1, ERX Overview*. For information about the E120 router and the E320 router, see *E120 and E320 Hardware Guide, Chapter 1, E120 and E320 Overview*.

In the E-series documentation, the term ERX-14xx models refers to both the ERX-1440 router and the ERX-1410 router. Similarly, the term ERX-7xx models refers to both the ERX-710 router and the ERX-705 router. The terms ERX-1440 router, ERX-1410 router, ERX-710 router, ERX-705 router, ERX-310 router, E120 router, and E320 router refer to the specific models.

## Documentation Conventions

Table 1 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.

Table 2 defines text conventions used in this guide and the syntax conventions used primarily in the *JUNOS Command Reference Guide*. For more information about command syntax, see *JUNOS System Basics Configuration Guide, Chapter 2, Command-Line Interface*.

**Table 2: Text and Syntax Conventions**

Convention	Description	Examples
<b>Text Conventions</b>		
<b>Bold text like this</b>	Represents commands and keywords in text.	<ul style="list-style-type: none"> <li>■ Issue the <b>clock source</b> command.</li> <li>■ Specify the keyword <b>exp-msg</b>.</li> </ul>
<b>Bold text like this</b>	Represents text that the user must type.	host1(config)# <b>traffic class low-loss1</b>
Fixed-width text like this	Represents information as displayed on your terminal's screen.	<pre>host1#show ip ospf 2 Routing Process OSPF 2 with Router ID 5.5.0.250 Router is an Area Border Router (ABR)</pre>
<i>Italic text like this</i>	<ul style="list-style-type: none"> <li>■ Emphasizes words.</li> <li>■ Identifies variables.</li> <li>■ Identifies chapter, appendix, and book names.</li> </ul>	<ul style="list-style-type: none"> <li>■ There are two levels of access, <i>user</i> and <i>privileged</i>.</li> <li>■ <i>clusterId</i>, <i>ipAddress</i>.</li> <li>■ <i>Appendix A, System Specifications</i>.</li> </ul>
Plus sign ( + ) linking key names	Indicates that you must press two or more keys simultaneously.	Press Ctrl + b.
<b>Syntax Conventions in the Command Reference Guide</b>		
Plain text like this	Represents keywords.	terminal length
<i>Italic text like this</i>	Represents variables.	<i>mask</i> , <i>accessListName</i>
(pipe symbol)	Represents a choice to select one keyword or variable to the left or right of this symbol. (The keyword or variable can be either optional or required.)	diagnostic   line
[ ] (brackets)	Represent optional keywords or variables.	[ internal   external ]
[ ]* (brackets and asterisk)	Represent optional keywords or variables that can be entered more than once.	[ level1   level2   11 ]*
{ } (braces)	Represent required keywords or variables.	<pre>{ permit   deny } { in   out } { clusterId   ipAddress }</pre>

## Using the no Version Versus the default Version of Commands

Most router configuration commands have a **no** version, which you can use to negate a command (or a portion of it specified by an optional keyword) or restore its default setting. When you use a command *without* the keyword **no**, you can reenables a disabled feature or override a default setting. You have the option of using the **default** keyword whenever the **no** keyword is also a choice; simply enter the keyword **default** instead of **no**.

In most cases, when you execute the **default** version of a command, it produces the exact results as the **no** version. There are some commands for which the **default** version yields a different result than the **no** version.

Commands for which the **default** behavior differs from the **no** behavior are clearly identified in this guide. Unless otherwise specified, therefore, the **default** command is identical to the **no** command and is neither documented nor discussed.

The syntax for each **no** command is described in this guide. Some commands do not have a **no** version; this is indicated in the individual command descriptions except for the **show** commands, none of which has a **no** version.

The CLI can act on **no** versions of commands when you have entered sufficient information to distinguish the command syntactically, and ignores all subsequent input on that line.

To be compatible with some non-E-series implementations, the **no** versions of commands accept the same options as the affirmative version of the commands. The CLI ignores the optional input if it has no effect on the command behavior. If using the option changes the behavior of the **no** version, the individual command entry in this guide describes the difference in behavior.

## Deprecated Commands

A command that has been deprecated in a release or in a particular configuration mode returns a notice when you issue the command manually:

NOTICE: This command is obsolete. It may be completely removed from a subsequent software release.

A preferred alternate command is provided in the notice. If you have a script that uses the deprecated command, the deprecated command is automatically mapped to the preferred command when you run the script. If the deprecated command no longer has a function, then that command has no effect when you run a script containing the command.

We recommend that you use the preferred command when writing new scripts.

## Filtering show Commands

You have access to a variety of **show** commands that display router and protocol information. You can filter the output of a **show** command by specifying **|** (the UNIX pipe symbol), one of the following keywords, and either a case-sensitive text string or a regular expression.

- **begin**—Displays output beginning with the first line that contains the text string or regular expression
- **include**—Displays output lines that contain the text string or regular expression and excludes lines that do not contain the text string or regular expression
- **exclude**—Displays output lines that do not contain the text string or regular expression and excludes lines that do contain the text string or regular expression

For a list of regular expressions, see *JUNOS IP Services Configuration Guide, Chapter 1, Configuring Routing Policy*.

You can press Ctrl + c to interrupt the **show** command output.



**NOTE:** The router does not recognize beginning spaces of the text string. For example, if you enter the **include** option with IP as the text string on which to filter, the router ignores the space and displays lines that include words such as RIP.

**Example** In the following example, the output display consists only of lines that contain the string *ip*. The router omits all other lines of the output from the display because none of them contain the string *ip*.

```
host1#show config include-defaults | include ip
! Configuration script generated on FRI NOV 12 1999 16:56:41 UTC
ip address 192.168.1.229 255.255.255.0
ip rip receive version 2 1
ip rip send version 1
ip rip authentication mode md5 17
ip rip authentication key
ip route 10.6.0.0 255.255.0.0 192.168.1.1
ip route 10.10.0.0 255.255.0.0 192.168.1.1
ip route 10.10.0.166 255.255.255.255 192.168.1.1
ip debounce-time 0
router rip
```

## Interface Types and Specifiers

Many commands take the variables *interfaceType* and *interfaceSpecifier*. Some commands support all types of interfaces, whereas other commands support only certain types of interfaces. Similarly, some commands support all interface specifier formats for a particular interface type, whereas other commands support only certain interface specifier formats.

Table 3 on page ix lists the interface specifiers for each type of interface on ERX-7xx models, ERX-14xx models, and the ERX-310 router.

Table 4 on page xv lists the interface specifiers for each type of interface on the E120 router and the E320 router.

**Table 3: Interface Types and Specifiers for ERX-7xx Models, ERX-14xx Models, and ERX-310 Router**

Interface Type	Description	Interface Specifier	Example
atm	ATM interface or ATM 1483 subinterface	Refer to the individual formats listed below.	
■ ATM interface or subinterface		To configure an ATM interface or subinterface: <i>slot/port[.subinterface]</i> ■ <i>slot</i> —Number of the chassis slot in the range 0–6 (ERX-7xx models), 0–13 (ERX-14xx models), and 0–2 (ERX-310 router) ■ <i>port</i> —Port number on the I/O module ■ <i>subinterface</i> —Number of the subinterface in the range 1–2147483647	atm 3/2.6

**Table 3: Interface Types and Specifiers for ERX-7xx Models, ERX-14xx Models, and ERX-310 Router (continued)**

Interface Type	Description	Interface Specifier	Example
■ ATM 1483 subinterface <sup>a</sup>		<p>To display information about an ATM 1483 subinterface by using <b>show</b> commands:</p> <p><i>slot/port/vpi/vci</i></p> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–6 (ERX-7xx models), 0–13 (ERX-14xx models), and 0–2 (ERX-310 router)</li> <li>■ <i>port</i>—Port number on the I/O module</li> <li>■ <i>vpi</i>—Virtual path identifier of the PVC on this ATM 1483 subinterface; allowable numeric range depends on the module capabilities and current configuration</li> <li>■ <i>vci</i>—Virtual circuit identifier of the PVC on this ATM 1483 subinterface; allowable numeric range depends on the module capabilities and current configuration</li> </ul>	atm 3/2/1/2
fastEthernet	IEEE 802.3 Fast Ethernet (FE) interface	<p><i>slot/port[.subinterface1[.subinterface2 ] ]</i></p> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–6 (ERX-7xx models), 0–13 (ERX-14xx models), and 0–2 (ERX-310 router)</li> <li>■ <i>port</i>—Port number on the I/O module or port 0 for the Fast Ethernet management port on the SRP I/O module</li> </ul> <p>The meaning of the <i>subinterface</i> variables depends on the configuration context. You can configure Fast Ethernet interfaces with or without VLANs.</p> <ul style="list-style-type: none"> <li>■ VLANs: <ul style="list-style-type: none"> <li>■ <i>subinterface1</i>—Number of the VLAN subinterface in the range 1–2147483647; no more than 4096 VLAN subinterfaces per Fast Ethernet physical port</li> <li>■ <i>subinterface2</i>—When using PPPoE, the number of the PPPoE subinterface in the range 1–2147483647; no more than 4094 PPPoE subinterfaces per Fast Ethernet physical port</li> </ul> </li> <li>■ No VLANs: <ul style="list-style-type: none"> <li>■ <i>subinterface1</i>—When using PPPoE, the number of the PPPoE subinterface in the range 1–2147483647; no more than 4094 PPPoE subinterfaces per Fast Ethernet physical port</li> <li>■ <i>subinterface2</i>—Not used</li> </ul> </li> </ul>	fastEthernet 3/2.6.20

**Table 3: Interface Types and Specifiers for ERX-7xx Models, ERX-14xx Models, and ERX-310 Router (continued)**

Interface Type	Description	Interface Specifier	Example
gigabitEthernet	IEEE 802.3 Gigabit Ethernet (GE) interface	<i>slot/port[.subinterface1[.subinterface2 ] ]</i> ■ <i>slot</i> —Number of the chassis slot in the range 0–6 (ERX-7xx models), 0–13 (ERX-14xx models), and 0–2 (ERX-310 router) ■ <i>port</i> —Port number on the I/O module The meaning of the <i>subinterface</i> variables depends on the configuration context. You can configure Gigabit Ethernet interfaces with or without VLANs. ■ VLANs: ■ <i>subinterface1</i> —Number of the VLAN subinterface in the range 1–2147483647; no more than 4096 VLAN subinterfaces per Gigabit Ethernet physical port ■ <i>subinterface2</i> —When using PPPoE, the number of the PPPoE subinterface in the range 1–2147483647; no more than 4094 PPPoE subinterfaces per Gigabit Ethernet physical port ■ No VLANs: ■ <i>subinterface1</i> —When using PPPoE, the number of the PPPoE subinterface in the range 1–2147483647; no more than 4094 PPPoE subinterfaces per Gigabit Ethernet physical port ■ <i>subinterface2</i> —Not used	gigabitEthernet 3/0.6.20
lag	IEEE 802.3ad link aggregation group (LAG) interface	<i>bundle-name[.subinterface ]</i> ■ <i>bundle-name</i> —Name of the bundle ■ <i>subinterface</i> —Number of the LAG subinterface in the range 1–2147483647	lag paris.2
loopback	Loopback interface	<i>integer</i> ■ <i>integer</i> —Integer in the range 1–4294967293	loopback 20
mlframe-relay	Multilink frame relay interface	<i>bundle-name[.subinterface ]</i> ■ <i>bundle-name</i> —Name of the bundle ■ <i>subinterface</i> —Number of the MLFR subinterface in the range 1–4294967293	mlframe-relay boston.1
mlppp	Multilink PPP interface	<i>bundle-name</i> ■ <i>bundle-name</i> —Name of the bundle	mlppp chicago
mplsL2shim	MPLS shim interface	<i>slot/port[.subinterface ]</i> ■ <i>slot</i> —Number of the chassis slot in the range 0–6 (ERX-7xx models), 0–13 (ERX-14xx models), and 0–2 (ERX-310 router) ■ <i>port</i> —Port number on the I/O module ■ <i>subinterface</i> —Number of the subinterface in the range 1–2147483647	mplsL2shim 3/2.1

**Table 3: Interface Types and Specifiers for ERX-7xx Models, ERX-14xx Models, and ERX-310 Router (continued)**

Interface Type	Description	Interface Specifier	Example
mplsMajor	MPLS major interface	<i>slot/port[.subinterface]</i> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–6 (ERX-7xx models), 0–13 (ERX-14xx models), and 0–2 (ERX-310 router)</li> <li>■ <i>port</i>—Port number on the I/O module</li> <li>■ <i>subinterface</i>—Number of the subinterface in the range 1–2147483647</li> </ul>	mplsMajor 3/2.1
mplsMinor	MPLS minor interface	[ <i>vr:</i> ] <i>tunnel-name</i> <ul style="list-style-type: none"> <li>■ <i>vr</i>—Name of a virtual router</li> <li>■ <i>tunnel-name</i>—Name of the tunnel</li> </ul>	mplsMinor lsp-02020202-1-4
null <sup>b</sup>	Null interface, which cannot forward or receive traffic	0	null 0
pos	Packet over SONET (POS) interface	<i>slot/port[.subinterface]</i> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–6 (ERX-7xx models), 0–13 (ERX-14xx models), and 0–2 (ERX-310 router)</li> <li>■ <i>port</i>—Port number on the I/O module</li> <li>■ <i>subinterface</i>—Number of the subinterface in the range 1–2147483647<sup>c</sup></li> </ul>	pos 3/2
serial	CT3, E3 Frame, T3 Frame, or cOCx/STMx interface	Refer to the individual formats listed below.	
■ CT3		<i>slot/port:channel/subchannel[.subinterface]</i> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–6 (ERX-7xx models) and 0–13 (ERX-14xx models)</li> <li>■ <i>port</i>—Port number on the I/O module</li> <li>■ <i>channel</i>—Number of a T1 channel on a CT3 module; in the range 1–28</li> <li>■ <i>subchannel</i>—Number of the channel group associated with a range of DS0 timeslots on a CT3 module; in the range 1–28</li> <li>■ <i>subinterface</i>—Number of the subinterface in the range 1–2147483647<sup>c</sup></li> </ul>	serial 3/2:20/15
■ E3/T3 Frame		<i>slot/port[.subinterface]</i> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–6 (ERX-7xx models) and 0–13 (ERX-14xx models)</li> <li>■ <i>port</i>—Port number on the I/O module</li> <li>■ <i>subinterface</i>—Number of the subinterface in the range 1–2147483647<sup>c</sup></li> </ul>	serial 3/2



**Table 3: Interface Types and Specifiers for ERX-7xx Models, ERX-14xx Models, and ERX-310 Router (continued)**

Interface Type	Description	Interface Specifier	Example
■ cOCx/STMx: unframed E1		<i>slot/port/path-channel/path-payload/ tributary-group/tributary-number/ channelNumber[.subinterface ]</i> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–6 (ERX-7xx models), 0–13 (ERX-14xx models), and 0–2 (ERX-310 router)</li> <li>■ <i>port</i>—Port number on the I/O module</li> <li>■ <i>path-channel</i>—Number of the STS-1 or STM-0 line in the range 1–2147483648</li> <li>■ <i>path-payload</i>—Number of the payload within the path</li> <li>■ <i>tributary-group</i>—Number of the tributary group within the path</li> <li>■ <i>tributary-number</i>—Number of the tributary within the group</li> <li>■ <i>channelNumber</i>—1 (the router assigns the number one to an unframed E1 channel)</li> <li>■ <i>subinterface</i>—Number of the subinterface in the range 1–2147483647<sup>c</sup></li> </ul>	serial 3/0:10/1/2/2/1
■ cOCx/STMx: fractional E1/T1		<i>slot/port/path-channel/path-payload/ tributary-group/tributary-number/ channel-group[.subinterface ]</i> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–6 (ERX-7xx models), 0–13 (ERX-14xx models), and 0–2 (ERX-310 router)</li> <li>■ <i>port</i>—Port number on the I/O module</li> <li>■ <i>path-channel</i>—Number of the STS-1 or STM-0 line in the range 1–2147483648</li> <li>■ <i>path-payload</i>—Number of the payload within the path</li> <li>■ <i>tributary-group</i>—Number of the tributary group within the path</li> <li>■ <i>tributary-number</i>—Number of the tributary within the group</li> <li>■ <i>channel-group</i>—Number of a fractional T1 or E1 line</li> <li>■ <i>subinterface</i>—Number of the subinterface in the range 1–2147483647<sup>c</sup></li> </ul>	serial 3/0:10/1/2/2/1
■ cOCx/STMx: unchannelized DS3		<i>slot/port/path-channel/ds3-channel-number [.subinterface ]</i> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–6 (ERX-7xx models), 0–13 (ERX-14xx models), and 0–2 (ERX-310 router)</li> <li>■ <i>port</i>—Port number on the I/O module</li> <li>■ <i>path-channel</i>—Number of the STS-1 or STM-0 line in the range 1–2147483648</li> <li>■ <i>ds3-channel-number</i>—Number of a T3 channel</li> <li>■ <i>subinterface</i>—Number of the subinterface in the range 1–2147483647<sup>c</sup></li> </ul>	serial 3/0:1/1

**Table 3: Interface Types and Specifiers for ERX-7xx Models, ERX-14xx Models, and ERX-310 Router (continued)**

Interface Type	Description	Interface Specifier	Example
■ cOCx/STMx: DS3 channelized to DS0		<code>slot/port:path-channel/ds3-channel-number/ ds1-channel-number/subchannel-number [.subinterface]</code> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–6 (ERX-7xx models), 0–13 (ERX-14xx models), and 0–2 (ERX-310 router)</li> <li>■ <i>port</i>—Port number on the I/O module</li> <li>■ <i>path-channel</i>—Number of the STS-1 or STM-0 line in the range 1–2147483648</li> <li>■ <i>ds3-channel-number</i>—Number of a T3 channel</li> <li>■ <i>ds1-channel-number</i>—Number of a T1 channel</li> <li>■ <i>subchannel-number</i>—Number of a fractional T1 channel</li> <li>■ <i>subinterface</i>—Number of the subinterface in the range 1–2147483647<sup>c</sup></li> </ul>	serial 3/0:1/1/10/15
sonet – line layer	Line layer of a SONET/SDH interface	<code>slot/port</code> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–6 (ERX-7xx models), 0–13 (ERX-14xx models), and 0–2 (ERX-310 router)</li> <li>■ <i>port</i>—Port number on the I/O module</li> </ul>	sonet 3/0
sonet – path layer	Path layer of a SONET/SDH interface	<code>slot/port:path-channel</code> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–6 (ERX-7xx models), 0–13 (ERX-14xx models), and 0–2 (ERX-310 router)</li> <li>■ <i>port</i>—Port number on the I/O module</li> <li>■ <i>path-channel</i>—Number of the STS-1 or STM-0 line in the range 1–2147483648</li> </ul>	sonet 3/0:2
sonet – section layer	Section layer of a SONET/SDH interface	<code>slot/port</code> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–6 (ERX-7xx models), 0–13 (ERX-14xx models), and 0–2 (ERX-310 router)</li> <li>■ <i>port</i>—Port number on the I/O module</li> </ul>	sonet 3/0
tunnel	Tunnel interface	<code>tunnel-type:tunnel-name[.subinterface]</code> <ul style="list-style-type: none"> <li>■ <i>tunnel-type</i>—Type of the tunnel: dvmrp, gre, ipsec, l2tp, or mpls</li> <li>■ <i>tunnel-name</i>—Name of the tunnel</li> <li>■ <i>subinterface</i>—For GRE tunnels, number of the subinterface in the range 1–2147483647<sup>c</sup></li> </ul>	tunnel gre:boston

a. You can use the **atm slot/port/vpi/vci** interface specifier format as an alternative to the **atm slot/port.subinterface** format with the specific **show interface** and **show subinterface** commands to monitor all ATM 1483 subinterfaces (except NBMA interfaces) as well as the upper-layer interfaces configured over an ATM 1483 subinterface. You cannot, however, use the **atm slot/port/vpi/vci** format to create or modify an ATM 1483 subinterface.

b. You cannot configure values on the null interface. This interface acts as a data sink; it cannot forward or receive traffic.

**Table 4: Interface Types and Specifiers for E120 Router and E320 Router**

Interface Type	Description	Interface Specifier	Example
atm	ATM interface or ATM 1483 subinterface	Refer to the individual formats listed below.	
■ ATM interface or subinterface		<p>To configure an ATM interface or subinterface:</p> <p><i>slot/adapter/port[.subinterface ]</i></p> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–5 (E120 router) and 0–5 or 11–16 (E320 router)</li> <li>■ <i>adapter</i>—Identifier for the IOA within the chassis slot, either 0 or 1, where: <ul style="list-style-type: none"> <li>■ 0 indicates that the IOA is installed in the right IOA bay (E120 router) or the upper IOA bay (E320 router).</li> <li>■ 1 indicates that the IOA is installed in the left IOA bay (E120 router) or the lower IOA bay (E320 router).</li> </ul> </li> <li>■ <i>port</i>—Port number on the IOA</li> <li>■ <i>subinterface</i>—Number of the subinterface in the range 1–2147483647</li> </ul>	atm 3/1/7.6
■ ATM 1483 subinterface <sup>a</sup>		<p>To display information about an ATM 1483 subinterface by using <b>show</b> commands:</p> <p><i>slot/adapter/port/vpi/vci</i></p> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–5 (E120 router) and 0–5 or 11–16 (E320 router)</li> <li>■ <i>adapter</i>—Identifier for the IOA within the chassis slot, either 0 or 1, where: <ul style="list-style-type: none"> <li>■ 0 indicates that the IOA is installed in the right IOA bay (E120 router) or the upper IOA bay (E320 router).</li> <li>■ 1 indicates that the IOA is installed in the left IOA bay (E120 router) or the lower IOA bay (E320 router).</li> </ul> </li> <li>■ <i>port</i>—Port number on the IOA</li> <li>■ <i>vpi</i>—Virtual path identifier of the PVC on this ATM 1483 subinterface; numeric range for the E120 and E320 routers is 0–255</li> <li>■ <i>vci</i>—Virtual circuit identifier of the PVC on this ATM 1483 subinterface; numeric range for the E120 and E320 routers is 1–65535</li> </ul>	atm 3/1/7/1/2

**Table 4: Interface Types and Specifiers for E120 Router and E320 Router (continued)**

Interface Type	Description	Interface Specifier	Example
fastEthernet (for Fast Ethernet management port on SRP IOA)	IEEE 802.3 Fast Ethernet (FE) interface	<i>slot/adaptor/port</i> ■ <i>slot</i> —Number of the chassis slot, either 6 or 7 ■ <i>adaptor</i> —Identifier for the SRP I/O adapter (IOA) within the chassis slot; always 0 ■ <i>port</i> —Port number on the SRP IOA; always 0	fastEthernet 6/0/0
gigabitEthernet	IEEE 802.3 Gigabit Ethernet (GE) interface	<i>slot/adaptor/port[.subinterface1[.subinterface2 ] ]</i> ■ <i>slot</i> —Number of the chassis slot in the range 0–5 (E120 router) and 0–5 or 11–16 (E320 router) ■ <i>adaptor</i> —Identifier for the IOA within the chassis slot, either 0 or 1, where: ■ 0 indicates that the IOA is installed in the right IOA bay (E120 router) or the upper IOA bay (E320 router). ■ 1 indicates that the IOA is installed in the left IOA bay (E120 router) or the lower IOA bay (E320 router). ■ <i>port</i> —Port number on the IOA The meaning of the <i>subinterface</i> variables depends on the configuration context. You can configure Gigabit Ethernet interfaces with or without VLANs. ■ VLANs: ■ <i>subinterface1</i> —Number of the VLAN subinterface in the range 1–2147483647; no more than 4096 VLAN subinterfaces per Gigabit Ethernet physical port ■ <i>subinterface2</i> —When using PPPoE, the number of the PPPoE subinterface in the range 1–2147483647; no more than 4094 PPPoE subinterfaces per Gigabit Ethernet physical port ■ No VLANs: ■ <i>subinterface1</i> —When using PPPoE, the number of the PPPoE subinterface in the range 1–2147483647; no more than 4094 PPPoE subinterfaces per Gigabit Ethernet physical port ■ <i>subinterface2</i> —Not used	gigabitEthernet 4/0/1.20
lag	IEEE 802.3ad link aggregation group (LAG) interface	<i>bundle-name[.subinterface ]</i> ■ <i>bundle-name</i> —Name of the bundle ■ <i>subinterface</i> —Number of the LAG subinterface in the range 1–2147483647	lag paris.2

**Table 4: Interface Types and Specifiers for E120 Router and E320 Router (continued)**

Interface Type	Description	Interface Specifier	Example
mplsL2shim	MPLS shim interface	<i>slot/adapter/port[.subinterface]</i> ■ <i>slot</i> —Number of the chassis slot in the range 0–5 (E120 router) and 0–5 or 11–16 (E320 router) ■ <i>adapter</i> —Identifier for the IOA within the chassis slot, either 0 or 1, where: ■ 0 indicates that the IOA is installed in the right IOA bay (E120 router) or the upper IOA bay (E320 router). ■ 1 indicates that the IOA is installed in the left IOA bay (E120 router) or the lower IOA bay (E320 router). ■ <i>port</i> —Port number on the IOA ■ <i>subinterface</i> —Number of the subinterface in the range 1–2147483647	mplsL2shim 3/0/2.1
mplsMajor	MPLS major interface	<i>slot/adapter/port[.subinterface]</i> ■ <i>slot</i> —Number of the chassis slot in the range 0–5 (E120 router) and 0–5 or 11–16 (E320 router) ■ <i>adapter</i> —Identifier for the IOA within the chassis slot, either 0 or 1, where: ■ 0 indicates that the IOA is installed in the right IOA bay (E120 router) or the upper IOA bay (E320 router). ■ 1 indicates that the IOA is installed in the left IOA bay (E120 router) or the lower IOA bay (E320 router). ■ <i>port</i> —Port number on the IOA ■ <i>subinterface</i> —Number of the subinterface in the range 1–2147483647	mplsMajor 3/0/2.1
mplsMinor	MPLS minor interface	<i>[vr:]tunnel-name</i> ■ <i>vr</i> —Name of a virtual router ■ <i>tunnel-name</i> —Name of the tunnel	mplsMinor lsp-02020202-1-4
pos	Packet over SONET (POS) interface	<i>slot/adapter/port</i> ■ <i>slot</i> —Number of the chassis slot in the range 0–5 (E120 router) and 0–5 or 11–16 (E320 router) ■ <i>adapter</i> —Identifier for the IOA within the chassis slot, either 0 or 1, where: ■ 0 indicates that the IOA is installed in the right IOA bay (E120 router) or the upper IOA bay (E320 router). ■ 1 indicates that the IOA is installed in the left IOA bay (E120 router) or the lower IOA bay (E320 router). ■ <i>port</i> —Port number on the IOA	pos 5/0/0

**Table 4: Interface Types and Specifiers for E120 Router and E320 Router (continued)**

Interface Type	Description	Interface Specifier	Example
sonet – line layer	Line layer of a SONET/SDH interface	<i>slot/adapter/port</i> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–5 (E120 router) and 0–5 or 11–16 (E320 router)</li> <li>■ <i>adapter</i>—Identifier for the IOA within the chassis slot, either 0 or 1, where: <ul style="list-style-type: none"> <li>■ 0 indicates that the IOA is installed in the right IOA bay (E120 router) or the upper IOA bay (E320 router).</li> <li>■ 1 indicates that the IOA is installed in the left IOA bay (E120 router) or the lower IOA bay (E320 router).</li> </ul> </li> <li>■ <i>port</i>—Port number on the IOA</li> </ul>	sonet 3/0/0
sonet – path layer	Path layer of a SONET/SDH interface	<i>slot/adapter/port</i> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–5 (E120 router) and 0–5 or 11–16 (E320 router)</li> <li>■ <i>adapter</i>—Identifier for the IOA within the chassis slot, either 0 or 1, where: <ul style="list-style-type: none"> <li>■ 0 indicates that the IOA is installed in the right IOA bay (E120 router) or the upper IOA bay (E320 router).</li> <li>■ 1 indicates that the IOA is installed in the left IOA bay (E120 router) or the lower IOA bay (E320 router).</li> </ul> </li> <li>■ <i>port</i>—Port number on the IOA</li> </ul>	sonet 3/0/0
sonet – section layer	Section layer of a SONET/SDH interface	<i>slot/adapter/port</i> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–5 (E120 router) and 0–5 or 11–16 (E320 router)</li> <li>■ <i>adapter</i>—Identifier for the IOA within the chassis slot, either 0 or 1, where: <ul style="list-style-type: none"> <li>■ 0 indicates that the IOA is installed in the right IOA bay (E120 router) or the upper IOA bay (E320 router).</li> <li>■ 1 indicates that the IOA is installed in the left IOA bay (E120 router) or the lower IOA bay (E320 router).</li> </ul> </li> <li>■ <i>port</i>—Port number on the IOA</li> </ul>	sonet 3/0/0

**Table 4: Interface Types and Specifiers for E120 Router and E320 Router (continued)**

Interface Type	Description	Interface Specifier	Example
tenGigabitEthernet	IEEE 802.3ae 10-Gigabit Ethernet (GE) interface	<code>slot/adapter/port[.subinterface1[.subinterface2 ] ]</code> <ul style="list-style-type: none"> <li>■ <i>slot</i>—Number of the chassis slot in the range 0–5 (E120 router) and 0–5 or 11–16 (E320 router)</li> <li>■ <i>adapter</i>—Identifier for the IOA within the chassis slot. 0 indicates that this is a full-height IOA.</li> <li>■ <i>port</i>—Port number on the IOA</li> </ul> <p>The meaning of the <i>subinterface</i> variables depends on the configuration context. You can configure 10-Gigabit Ethernet interfaces with or without VLANs.</p> <ul style="list-style-type: none"> <li>■ VLANs: <ul style="list-style-type: none"> <li>■ <i>subinterface1</i>—Number of the VLAN subinterface in the range 1–2147483647; no more than 4096 VLAN subinterfaces per 10-Gigabit Ethernet physical port</li> <li>■ <i>subinterface2</i>—When using PPPoE, the number of the PPPoE subinterface in the range 1–2147483647; no more than 4094 PPPoE subinterfaces per 10-Gigabit Ethernet physical port</li> </ul> </li> <li>■ No VLANs: <ul style="list-style-type: none"> <li>■ <i>subinterface1</i>—When using PPPoE, the number of the PPPoE subinterface in the range 1–2147483647; no more than 4094 PPPoE subinterfaces per 10-Gigabit Ethernet physical port</li> <li>■ <i>subinterface2</i>—Not used</li> </ul> </li> </ul>	tenGigabitEthernet 4/0/1.20
tunnel	Tunnel interface	<code>tunnel-type:tunnel-name[.subinterface]</code> <ul style="list-style-type: none"> <li>■ <i>tunnel-type</i>—Type of the tunnel: dvmrp, gre, l2tp, or mpls</li> <li>■ <i>tunnel-name</i>—Name of the tunnel</li> <li>■ <i>subinterface</i>—For GRE tunnels, number of the subinterface in the range 1–2147483647<sup>b</sup></li> </ul>	tunnel gre:boston

a. You can use the **atm** `slot/adapter/port/vpi/vci` interface specifier format as an alternative to the **atm** `slot/adapter/port.subinterface` format with the specific **show interface** and **show subinterface** commands to monitor all ATM 1483 subinterfaces (except NBMA interfaces) as well as the upper-layer interfaces configured over an ATM 1483 subinterface. You cannot, however, use the **atm** `slot/adapter/port/vpi/vci` format to create or modify an ATM 1483 subinterface.

b. You cannot configure values on the null interface. This interface acts as a data sink; it cannot forward or receive traffic.

## Related E-series and JUNOS Documentation

The E-series and JUNOS documentation set consists of several hardware and software guides, which are available in electronic and printed formats.

### E-series and JUNOS Documents

Table 5 lists and describes the E-series and JUNOS document set. For a complete list of abbreviations used in this document set, along with their spelled-out terms, see *JUNOS System Basics Configuration Guide, Appendix A, Abbreviations and Acronyms*.

**Table 5: Juniper Networks E-series and JUNOS Technical Publications**

Document	Description
<b>E-series Hardware Documentation</b>	
<i>E120 and E320 Quick Start Guide</i>	Shipped in the box with all new E120 and E320 routers. Provides the basic procedures to help you get the routers up and running quickly.
<i>E120 and E320 Hardware Guide</i>	<p>Provides the necessary procedures for getting E120 routers and E320 routers operational, including information about:</p> <ul style="list-style-type: none"> <li>■ Installing the chassis and modules</li> <li>■ Connecting cables</li> <li>■ Powering up the routers</li> <li>■ Configuring the routers for management access</li> <li>■ Troubleshooting common issues</li> </ul> <p>Describes switch route processor (SRP) modules, line modules, and I/O adapters (IOAs) available for E120 and E320 routers.</p>
<i>E120 and E320 Module Guide</i>	<p>Provides detailed specifications for line modules and IOAs in E120 and E320 routers, and information about the compatibility of these modules with JUNOS software releases.</p> <p>Lists the layer 2 protocols, layer 3 protocols, and applications that line modules and their corresponding IOAs support.</p> <p>Provides module LED information.</p>
<i>E-series Installation Quick Start poster or ERX Quick Start Guide</i>	Shipped in the box with all new ERX routers. Provides the basic procedures to help you get an ERX router up and running quickly.
<i>ERX Hardware Guide</i>	<p>Provides the necessary procedures for getting ERX-14xx models, ERX-7xx models, and ERX-310 routers operational, including information about:</p> <ul style="list-style-type: none"> <li>■ Installing the chassis and modules</li> <li>■ Connecting cables</li> <li>■ Powering up the routers</li> <li>■ Configuring the routers for management access</li> <li>■ Troubleshooting common issues</li> </ul> <p>Describes switch route processor (SRP) modules, line modules, and I/O modules available for the ERX routers.</p>
<i>ERX Module Guide</i>	<p>Provides detailed specifications for line modules and I/O modules in ERX-14xx models, ERX-7xx models, and ERX-310 routers, and information about the compatibility of these modules with JUNOS software releases.</p> <p>Lists the layer 2 protocols, layer 3 protocols, and applications that line modules and their corresponding I/O modules support.</p> <p>Provides module LED information.</p>



**Table 5: Juniper Networks E-series and JUNOS® Technical Publications (continued)**

Document	Description
<i>ERX End-of-Life Module Guide</i>	Provides an overview and description of ERX modules that are end-of-life (EOL) and can no longer be ordered for the following routers: <ul style="list-style-type: none"> <li>■ ERX-7xx models</li> <li>■ ERX-14xx models</li> <li>■ ERX-310 router</li> </ul>
<b>JUNOS® Software Guides</b>	
<i>JUNOS® System Basics Configuration Guide</i>	Provides information about: <ul style="list-style-type: none"> <li>■ Planning and configuring your network</li> <li>■ Using the command-line interface (CLI)</li> <li>■ Installing JUNOS® software</li> <li>■ Configuring the Simple Network Management Protocol (SNMP)</li> <li>■ Managing the router and its modules, including the use of high availability (HA) for SRP redundancy</li> <li>■ Configuring and running a unified in-service software upgrade (ISSU)</li> <li>■ Configuring passwords and security</li> <li>■ Configuring the router clock</li> <li>■ Configuring virtual routers</li> </ul>
<i>JUNOS® Physical Layer Configuration Guide</i>	Explains how to configure, test, and monitor physical layer interfaces.
<i>JUNOS® Link Layer Configuration Guide</i>	Explains how to configure and monitor static and dynamic link layer interfaces.
<i>JUNOS® IP, IPv6, and IGP Configuration Guide</i>	Explains how to configure and monitor IP, IPv6 and Neighbor Discovery, and interior gateway protocols (RIP, OSPF, and IS-IS).
<i>JUNOS® IP Services Configuration Guide</i>	Explains how to configure and monitor IP routing services. Topics include: <ul style="list-style-type: none"> <li>■ Routing policies</li> <li>■ Firewalls</li> <li>■ Network Address Translation (NAT)</li> <li>■ J-Flow statistics</li> <li>■ Bidirectional forwarding detection (BFD)</li> <li>■ Internet Protocol Security (IPSec)</li> <li>■ Access Node Control Protocol (ANCP), also known as Layer 2 Control (L2C)</li> <li>■ Digital certificates</li> <li>■ IP tunnels</li> <li>■ Virtual Router Redundancy Protocol (VRRP)</li> <li>■ Mobile IP home agent</li> </ul>
<i>JUNOS® Multicast Routing Configuration Guide</i>	Explains how to configure and monitor IP multicast routing and IPv6 multicast routing. Topics include: <ul style="list-style-type: none"> <li>■ Internet Group Management Protocol (IGMP)</li> <li>■ Protocol Independent Multicast (PIM)</li> <li>■ Distance Vector Multicast Routing Protocol (DVMRP)</li> <li>■ Multicast Listener Discovery (MLD)</li> </ul>

**Table 5: Juniper Networks E-series and JUNOS Technical Publications (continued)**

Document	Description
<i>JUNOS BGP and MPLS Configuration Guide</i>	Explains how to configure and monitor: <ul style="list-style-type: none"> <li>■ Border Gateway Protocol (BGP) routing</li> <li>■ Multiprotocol Label Switching (MPLS) and related applications</li> <li>■ Layer 2 services over MPLS</li> <li>■ Virtual private LAN service (VPLS)</li> <li>■ Layer 2 virtual private networks (L2VPNs)</li> </ul>
<i>JUNOS Policy Management Configuration Guide</i>	Explains how to configure, manage, and monitor customized policy rules for packet classification, forwarding, filtering, and flow rates. Also describes the packet mirroring feature, which uses secure policies.
<i>JUNOS Quality of Service Configuration Guide</i>	Explains how to configure quality of service (QoS) features to queue, schedule, and monitor traffic flow. These features include: <ul style="list-style-type: none"> <li>■ Traffic classes and traffic-class groups</li> <li>■ Drop, queue, QoS, and scheduler profiles</li> <li>■ QoS parameters</li> <li>■ Statistics</li> </ul>
<i>JUNOS Broadband Access Configuration Guide</i>	Explains how to configure and monitor a remote access environment, which can include the following features: <ul style="list-style-type: none"> <li>■ Authentication, authorization, and accounting (AAA)</li> <li>■ Dynamic Host Configuration Protocol (DHCP)</li> <li>■ Remote Authentication Dial-In User Service (RADIUS)</li> <li>■ Terminal Access Controller Access Control System (TACACS+)</li> <li>■ Layer 2 Tunneling Protocol (L2TP)</li> <li>■ Subscriber management</li> </ul>
<i>JUNOS System Event Logging Reference Guide</i>	Describes the JUNOS system logging feature and describes how to use the CLI to monitor your system's log configuration and system events.
<i>JUNOS Command Reference Guide A to M:</i> <i>JUNOS Command Reference Guide N to Z</i>	Together constitute the <i>JUNOS Command Reference Guide</i> . Contain important information about commands implemented in the system software. Use to look up: <ul style="list-style-type: none"> <li>■ Descriptions of commands and command parameters</li> <li>■ Command syntax</li> <li>■ A command's related mode</li> <li>■ Starting with JUNOS Release 7.1.0, a history of when a command, its keywords, and its variables were introduced or added</li> </ul> Use with the JUNOS configuration guides.
<i>JUNOS Comprehensive Index</i>	Provides a complete index of the JUNOS software documentation set.
<i>JUNOS Glossary</i>	Provides definitions for terms used in JUNOS technical documentation.
<b>Release Notes</b>	
<i>JUNOS Release Notes</i>	Provide the latest information about features, changes, known problems, resolved problems, and system maximum values. If the information in the <i>Release Notes</i> differs from the information found in the documentation set, follow the <i>Release Notes</i> .  Release notes are included on the corresponding software CD and are available on the Web.

## JUNOS<sup>e</sup> Configuration Guides

JUNOS<sup>e</sup> software configuration guides use a bottom-up approach to describe the relationship of layers, protocols, and interfaces in the configuration process. For more information, see *Layered Approach* in *JUNOS<sup>e</sup> System Basics Configuration Guide, Chapter 1, Planning Your Network*.

The chapters in JUNOS<sup>e</sup> software configuration guides typically include the following topics:

- Conceptual and overview information
- Information you need to know or tasks you need to perform before you begin
- Platform-specific issues you need to take into consideration
- Applicable references, such as RFCs and IETF draft documents, about the protocols and features supported by the router
- Required and optional tasks, as step-by-step procedures
- Descriptions and examples of the commands you use
- Illustrations of network topologies
- Examples of command sequences for configuration, testing, and monitoring activities
- Sample displays that result when you issue the **show** command

## Obtaining Documentation

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To obtain the most current version of all Juniper Networks technical documentation, see the products documentation page on the Juniper Networks Web site at <http://www.juniper.net/>.

To order printed copies of this manual and other Juniper Networks technical documents or to order a documentation CD, which contains this manual, contact your sales representative.

Copies of the Management Information Bases (MIBs) available in a software release are included on the software CDs and at <http://www.juniper.net/>.

## Documentation Feedback

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We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation to better meet your needs. Send your comments to [techpubs-comments@juniper.net](mailto:techpubs-comments@juniper.net), or fill out the documentation feedback form at <http://www.juniper.net/techpubs/docbug/docbugreport.html>. If you are using e-mail, be sure to include the following information with your comments:

- Document name
- Document part number

- Page number
- Software release version

## Requesting Technical Support

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

- **JTAC Policies**—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <http://www.juniper.net/customers/support/downloads/710059.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/>
- Search for known bugs:  
<http://www2.juniper.net/kb/>
- Find product documentation:  
<http://www.juniper.net/techpubs/>
- Find solutions and answer questions using our Knowledge Base:  
<http://kb.juniper.net/>
- Download the latest versions of software and review release notes:  
<http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications:  
<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 Manager:  
<http://www.juniper.net/cm/>

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool located at <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 Manager 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 <http://www.juniper.net/support/requesting-support.html>

