

Chapter 5

Using CLI Operational Commands to Monitor the Router

This chapter provides information about CLI operational commands.

Topics include:

- Overview of CLI Operational Mode Commands on page 50
- Using Operational Mode Commands on page 53
- Monitoring Who Uses the CLI on page 59
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- Managing Programs and Processes on page 66
- Using the Comment Character # on page 72

Overview of CLI Operational Mode Commands

This section provides an overview of operational mode commands.

Topics include:

- CLI Command Categories on page 50
- Commonly Used Operational Mode Commands on page 52

CLI Command Categories

When you log in to the router and the CLI starts, there are a number of broad groups of CLI commands:

- Commands for controlling the CLI environment—The commands in the **set** hierarchy configure the CLI display screen. For information about these commands, see “Controlling the CLI Environment” on page 145.
- Commands for monitoring and troubleshooting—The following commands display information and statistics about the software and test network connectivity. Detailed command descriptions are provided in the *JUNOS Interfaces Command Reference*.
 - **clear**—Clear statistics and protocol database information.
 - **mtrace**—Trace mtrace packets from source to receiver.
 - **monitor**—Perform real-time debugging of various software components, including the routing protocols and interfaces.
 - **ping**—Determine the reachability of a remote network host.
 - **show**—Display the current configuration and information about interfaces, routing protocols, routing tables, routing policy filters, system alarms, and the chassis.
 - **test**—Test the configuration and application of policy filters and autonomous system (AS) path regular expressions.
 - **traceroute**—Trace the route to a remote network host.
- Commands for connecting to other network systems—The **ssh** command opens secure shell connections, and the **telnet** command opens telnet sessions to other hosts on the network. For information about these commands, see the *JUNOS System Basics and Services Command Reference*.

- Commands for copying files—The **copy** command copies files from one location on the router to another, from the router to a remote system, or from a remote system to the router. For information about these commands, see the *JUNOS System Basics and Services Command Reference*.
- Commands for restarting software processes—The commands in the **restart** hierarchy restart the various JUNOS software processes, including the routing protocol, interface, and Simple Network Management Protocol (SNMP). For information about these commands, see the *JUNOS System Basics and Services Command Reference*.
- A command—**request**—for performing system-level operations, including stopping and rebooting the router and loading JUNOS software images. For information about this command, see the *JUNOS System Basics and Services Command Reference*.
- A command—**start**—to exit the CLI and start a UNIX shell. For information about this command, see the *JUNOS System Basics and Services Command Reference*.
- A command—**configure**—for entering configuration mode, which provides a series of commands that configure the JUNOS software, including the routing protocols, interfaces, network management, and user access. For information about the CLI configuration commands, see “Using Commands and Statements to Configure the Router” on page 75.
- A command—**quit**—to exit the CLI. For information about this command, see the *JUNOS System Basics and Services Command Reference*.
- For more information about the CLI operational mode commands, see the *JUNOS Interfaces Command Reference* and the *JUNOS System Basics and Services Command Reference*.

Commonly Used Operational Mode Commands

Table 7 lists some operational commands you may find useful for monitoring router operation. For a complete description of operational commands, see the JUNOS command references.

Table 7: Commonly Used Operational Mode Commands

Items to Check	Description	Command
Software version	Versions of software running on the router	show version
Log files	Contents of the log files	monitor
	Log files and their contents and recent user logins	show log
Remote systems	Host reachability and network connectivity	ping
	Route to a network system	traceroute
Configuration	Current system configuration	show configuration
Manipulate files	List of files and directories on the router	file list
	Contents of a file	file show
Interface information	Detailed information about interfaces	show interfaces
Chassis	Chassis alarm status	show chassis alarms
	Information currently on craft display	show chassis craft-interface
	Router environment information	show chassis environment
	Hardware inventory	show chassis hardware
Routing table information	Information about entries in the routing tables	show route
Forwarding table information	Information about data in the kernel's forwarding table	show route forwarding-table
IS-IS	Adjacent routers	show isis adjacency
OSPF	Display standard information about OSPF neighbors	show ospf neighbor
BGP	Display information about Border Gateway Protocol (BGP) neighbors	show bgp neighbor
MPLS	Status of interfaces on which MPLS is running	show mpls interface
	Configured LSPs on the router, as well as all ingress, transit, and egress LSPs	show mpls lsp
	Routes that form a label-switched path	show route label-switched path
RSVP	Status of interfaces on which RSVP is running	show rsvp interface
	Currently active RSVP sessions	show rsvp session
	RSVP packet and error counters	show rsvp statistics

Using Operational Mode Commands

This section describes some general features found in CLI operational mode commands and provides some examples.

Topics include:

- Commands with Brief, Detail, Extensive, or Terse Options on page 53
- Commands That Combine Other Commands on page 55
- Controlling the Scope of a Command on page 56

Commands with *Brief, Detail, Extensive, or Terse Options*

Operational commands can include **brief**, **detail**, **extensive**, or **terse** options. Use these options to control the amount of information you want to view.

1. Use the **?** prompt to list options available for the command. For example:

```

user@host> show interfaces fe-1/1/1 ?
Possible completions:
<[Enter]>      Execute this command
brief          Display brief output
descriptions   Display interface description strings
detail         Display detailed output
extensive      Display extensive output
media          Display media information
snmp-index     SNMP index of interface
statistics     Display statistics and detailed output
terse          Display terse output
|             Pipe through a command

```

2. Choose the option you wish to use with the command. (See Figure 11.)

Figure 11: Command Output Options

Command output with the brief option.

```

user@host> show interfaces fe-1/1/1 brief
Physical interface: fe-1/1/1, Enabled, Physical link is Down
Link-level type: Ethernet, MTU: 1514, Speed: 100mbps, Loopback:
Disabled, Source filtering: Disabled,
Flow control: Enabled
Device flags : Present Running Down
Interface flags: Hardware-Down SNMP-Traps Internal: 0x4000
Link flags   : None
    
```

Command output with the terse option.

```

user@host> show interfaces fe-1/1/1 terse
Interface      Admin Link Proto  Local      Remote
fe-1/1/1      up    down
    
```

Command output with the extensive option.

```

user@host> show interfaces fe-1/1/1 extensive
Physical interface: fe-1/1/1, Enabled, Physical link is Down
Interface index: 141, SNMP ifIndex: 33, Generation: 24
Link-level type: Ethernet, MTU: 1514, Speed: 100mbps, Loopback:
Disabled, Source filtering: Disabled,
Flow control: Enabled
Device flags : Present Running Down
Interface flags: Hardware-Down SNMP-Traps Internal: 0x4000
Link flags   : None
CoS queues   : 4 supported, 4 maximum usable queues
Hold-times   : Up 0 ms, Down 0 ms
Current address: 00:90:69:d0:f8:9e, Hardware address: 00:90:69:d0:f8:9e
Last flapped : 2006-02-02 09:26:25 PST (2w0d 03:40 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes :          0          0 bps
Output bytes :          0          0 bps
Input packets:          0          0 pps
Output packets:          0          0 pps
---(more)---
    
```

Commands That Combine Other Commands

In some cases, an operational command is created from a combination of other operational commands. These commands can be useful shortcuts for collecting information about the router. (See Figure 12.)

Figure 12: Commands That Combine Other Commands

The request support information command provides output from a combination of other operational commands.

```

user@host> request support information

root@host> show system uptime

Current time: 2006-02-16 13:10:08 PST
System booted: 2006-02-02 09:21:50 PST (2w0d 03:48 ago)
Protocols started: 2006-02-02 09:24:42 PST (2w0d 03:45 ago)
Last configured: 2006-02-16 03:04:58 PST (10:05:10 ago) by root
1:10PM up 14 days, 3:48, 2 users, load averages: 0.01, 0.02, 0.00

root@host> show version detail

Hostname: host
Model: m320
JUNOS Base OS boot [8.1-R1.1]

root@host> show system core-dumps

/var/tmp/*core*: No such file or directory
/var/crash/kernel.*: No such file or directory

/var/crash/cores:
total 9780
-rw-r--r-- 1 root wheel 4990976 Feb 9 15:39
core-FPC2.core.0.060209.1539

root@host> show chassis hardware detail

Hardware inventory:
Item          Version  Part number  Serial number  Description
Chassis              REV 07  710-001517  AW4431        M20 Backplane
Backplane           REV 09  740-001466  004233        DC Power Supply
Power Supply B

```

Controlling the Scope of a Command

CLI operational commands include options you can use to identify specific components on the router. For example:

1. Type the `show interfaces` command to display information about all interfaces on the router.

```
user@host> show interfaces
Physical interface: so-0/0/0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 260
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC3,
  Loopback: None, FCS: 16,
  Payload scrambler: Enabled
  Device flags: Present Running Up
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags: Keepalives
  CoS queues: 4 supported, 4 maximum usable queues
  Last flapped: 2006-02-02 09:26:25 PST (2w0d 06:20 ago)
  Input rate: 0 bps (0 pps)
  Output rate: 0 bps (0 pps)
  SONET alarms: LOL, LOS
  SONET defects: LOL, LOF, LOS, SEF, AIS-L, AIS-P

Physical interface: so-0/0/1, Enabled, Physical link is Up
  Interface index: 129, SNMP ifIndex: 271
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC3,
  Loopback: None, FCS: 16,
  Payload scrambler: Enabled
--(more)--
```

2. To display information about a specific interface, type that interface as a command option:

```
user@host> show interfaces fe-1/1/1
Physical interface: fe-1/1/1, Enabled, Physical link is Up
  Interface index: 141, SNMP ifIndex: 33
  Link-level type: Ethernet, MTU: 1514, Speed: 100mbps, Loopback: Disabled,
  Source filtering: Disabled,
  Flow control: Enabled
  Device flags: Present Running Up
  Interface flags: Hardware-Down SNMP-Traps Internal: 0x4000
  Link flags: None
  CoS queues: 4 supported, 4 maximum usable queues
  Current address: 00:90:69:d0:f8:9e, Hardware address: 00:90:69:d0:f8:9e
  Last flapped: 2006-02-02 09:26:25 PST (2w0d 06:25 ago)
  Input rate: 0 bps (0 pps)
  Output rate: 0 bps (0 pps)
  Active alarms: LINK
  Active defects: LINK

user@host>
```

For more information on specifying interface names as command options, see “Using the Comment Character #” on page 72.

Operational Mode Commands on a TX Matrix Platform

When you issue operational mode commands on the TX Matrix platform, CLI command options allow you to restrict the command output to show only a component of the routing matrix rather than to the routing matrix as a whole.

These are the options shown in the CLI:

- `scc`—The TX Matrix platform.
- `lcc number`—A specific T640 routing node.
- `all-lcc`—All T640 routing nodes.

If you specify none of these options, then the command applies by default to the whole routing matrix: the TX Matrix platform and all connected T640 routing nodes.

Examples of Routing Matrix Command Options

The following output samples, using the `show version` command, demonstrate some different options for viewing information about the routing matrix.

```
user@host> show version ?
Possible completions:
<[Enter]>      Execute this command
all-lcc        Show software version on all LCC chassis
brief          Display brief output
detail         Display detailed output
lcc            Show software version on specific LCC (0..3)
scc            Show software version on the SCC
|              Pipe through a command
```

Sample Output: No Routing Matrix Options Specified

```
user@host> show version
scc-re0:
-----
Hostname: scc
Model: TX Matrix
JUNOS Base OS boot [7.0-20040630.0]
JUNOS Base OS Software Suite [7.0-20040629.0]
JUNOS Kernel Software Suite [7.0-20040630.0]
JUNOS Packet Forwarding Engine Support (T-Series) [7.0-20040630.0]
JUNOS Routing Software Suite [7.0-20040630.0]
JUNOS Online Documentation [7.0-20040630.0]
JUNOS Crypto Software Suite [7.0-20040630.0]

lcc0-re0:
-----
Hostname: lcc0
Model: t640
JUNOS Base OS boot [7.0-20040630.0]
JUNOS Base OS Software Suite [7.0-20040629.0]
JUNOS Kernel Software Suite [7.0-20040630.0]
JUNOS Packet Forwarding Engine Support (T-Series) [7.0-20040630.0]
JUNOS Routing Software Suite [7.0-20040630.0]
JUNOS Online Documentation [7.0-20040630.0]
JUNOS Crypto Software Suite [7.0-20040630.0]
JUNOS Support Tools Package [7.0-20040630.0]
```

lcc1-re0:

```
-----
Hostname: lcc1
Model: t640
JUNOS Base OS boot [7.0-20040630.0]
JUNOS Base OS Software Suite [7.0-20040629.0]
JUNOS Kernel Software Suite [7.0-20040630.0]
JUNOS Packet Forwarding Engine Support (T-Series) [7.0-20040630.0]
JUNOS Routing Software Suite [7.0-20040630.0]
JUNOS Online Documentation [7.0-20040630.0]
JUNOS Crypto Software Suite [7.0-20040630.0]
JUNOS Support Tools Package [7.0-20040630.0]
```

**Sample Output: TX
Matrix Platform Only
(scc Option)**

```
user@host> show version scc
Hostname: scc
Model: TX Matrix
JUNOS Base OS boot [7.0-20040630.0]
JUNOS Base OS Software Suite [7.0-20040629.0]
JUNOS Kernel Software Suite [7.0-20040630.0]
JUNOS Packet Forwarding Engine Support (T-Series) [7.0-20040630.0]
JUNOS Routing Software Suite [7.0-20040630.0]
JUNOS Online Documentation [7.0-20040630.0]
JUNOS Crypto Software Suite [7.0-20040630.0]
```

**Sample Output: Specific
T640 Routing Node (lcc
number Option)**

```
user@host> show version lcc 0
lcc0-re0:
-----
Hostname: lcc0
Model: t640
JUNOS Base OS boot [7.0-20040630.0]
JUNOS Base OS Software Suite [7.0-20040629.0]
JUNOS Kernel Software Suite [7.0-20040630.0]
JUNOS Packet Forwarding Engine Support (T-Series) [7.0-20040630.0]
JUNOS Routing Software Suite [7.0-20040630.0]
JUNOS Online Documentation [7.0-20040630.0]
JUNOS Crypto Software Suite [7.0-20040630.0]
JUNOS Support Tools Package [7.0-20040630.0]
```

**Sample Output: All
T640 routing nodes
(all-lcc Option)**

```
user@host> show version all-lcc
lcc0-re0:
-----
Hostname: lcc0
Model: t640
JUNOS Base OS boot [7.0-20040630.0]
JUNOS Base OS Software Suite [7.0-20040629.0]
JUNOS Kernel Software Suite [7.0-20040630.0]
JUNOS Packet Forwarding Engine Support (T-Series) [7.0-20040630.0]
JUNOS Routing Software Suite [7.0-20040630.0]
JUNOS Online Documentation [7.0-20040630.0]
JUNOS Crypto Software Suite [7.0-20040630.0]
JUNOS Support Tools Package [7.0-20040630.0]
```

```
lcc1-re0:
```

```
-----
Hostname: lcc1
Model: t640
JUNOS Base OS boot [7.0-20040630.0]
JUNOS Base OS Software Suite [7.0-20040629.0]
JUNOS Kernel Software Suite [7.0-20040630.0]
JUNOS Packet Forwarding Engine Support (T-Series) [7.0-20040630.0]
JUNOS Routing Software Suite [7.0-20040630.0]
JUNOS Online Documentation [7.0-20040630.0]
JUNOS Crypto Software Suite [7.0-20040630.0]
JUNOS Support Tools Package [7.0-20040630.0]
```

Monitoring Who Uses the CLI

Depending upon how you configure the JUNOS software, multiple users can log in to the router, use the CLI, and configure or modify the software configuration.

If, when you enter configuration mode, another user is also in configuration mode, a notification message is displayed that indicates who the user is and what portion of the configuration they are viewing or editing:

```
user@host> configure
Entering configuration mode
Current configuration users:
  root terminal p3 (pid 1088) on since 1999-05-13 01:03:27 EDT
    [edit interfaces so-3/0/0 unit 0 family inet]
The configuration has been changed but not committed
```

Interface Naming Conventions

This section discusses interface naming conventions used in operational commands.

Topics include:

- Physical Part of an Interface Name on page 60
- Logical Part of an Interface Name on page 60
- Channel Identifier Part of an Interface Name on page 61

Physical Part of an Interface Name

The M-series and T-series routing platforms use one convention, while the J-series routing platform uses another.

- M-series and T-series interface names—On the M-series and T-series platforms, when you display information about an interface, you specify the interface type, the slot in which the Flexible PIC Concentrator (FPC) is installed, the slot on the FPC in which the Physical Interface Card (PIC) is located, and the configured port number.

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

type-fpc/pic/port



NOTE: Exceptions to the *type-fpc/pic/port* physical description include the aggregated Ethernet and aggregated SONET/SDH interfaces, which use the syntax *aenumber* and *asnumber*, respectively.

- J-series interface names—On the J-series routing platform, when you display information about an interface, you specify the interface type, the slot in which the Physical Interface Module (PIM) is installed, 0, and the configured port number.

In the physical part of the interface name, a hyphen (-) separates the media type from the PIM number, and a slash (/) separates the PIM, 0, and port numbers:

type-pim/0/port



NOTE: An exception to the *type-pim/0/port* physical description is the Integrated Services Digital Network (ISDN) dialer interface, which uses the syntax *dlnumber*.

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 16,384. In the virtual part of the name, a period (.) separates the port and logical unit numbers:

- M-series and T-series routing platforms:

type-fpc/pic/port.logical

- J-series routing platform:

type-pim/0/port.logical

Channel Identifier 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 intelligent queuing (IQ) interfaces, channel 1 identifies the first channelized interface.



NOTE: Depending on the type of channelized interface, up to three levels of channelization can be specified. For more information, see the *JUNOS Network Interfaces Configuration Guide*.

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

- M-series and T-series routing platforms:

```
type-fpc/pic/port:channel
type-fpc/pic/port:channel:channel
type-fpc/pic/port:channel:channel:channel
```

- J-series routing platforms:

```
type-pim/0/port:channel
type-pim/0/port:channel:channel
type-pim/0/port:channel:channel:channel
```

Viewing Files and Directories

The JUNOS software stores information in files on the router, including configuration files, log files, and router software files. This section shows some examples of operational commands you can use to view files and directories on the router.

Topics include:

- Directories on the Router on page 62
- Listing Files and Directories on page 62

Directories on the Router

Some standard directories on the router are shown in Table 8.

Table 8: Directories on the Router

Directory	Description
/config	This directory is located on the router's internal flash drive. It contains the active configuration (<code>juniper.conf</code>) and rollback files 1, 2, and 3.
/var/db/config	This directory is located on the router's hard drive and contains rollback files 4 through 9.
/var/tmp	This directory is located on the router's hard drive. It holds core files from the various daemons on the Routing Engines. Core files are generated when a particular daemon crashes and are used by Juniper Networks engineers to diagnose the reason for failure.
/var/log	This directory is located on the router's hard drive. It contains files generated by both the router's logging function as well as the <code>traceoptions</code> command.
/var/home	This directory is located on the router's hard drive. It contains a subdirectory for each configured user on the router. These individual user directories are the default file location for many JUNOS software commands.
/altroot	This directory is located on the router's hard drive and contains a copy of the root file structure from the internal flash drive. This directory is used in certain disaster-recovery modes where the internal flash drive is not operational.
/altconfig	This directory is located on the router's hard drive and contains a copy of the <code>/config</code> file structure from the internal flash drive. This directory is also used in certain disaster recovery modes where the internal flash drive is not operational.

Listing Files and Directories

You can view the router's directory structure as well as individual files by issuing the `file` command in operational mode.

- To get help about the `file` command, type the following:

```
user@host> file ?
Possible completions:
compare  Compare files (local)
copy     Copy files (local or remote)
delete   Delete files from the system (local)
list     List file information (local)
rename   Rename files (local)
show     Display file contents (local)
```

Help shows that the `file` command includes several options for manipulating files.

2. Use the `list` option to see the directory structure of the router. For example, to show the files located in your home directory on the router:

```
user@host> file list
.ssh/
common
```

The default directory for the `file list` command is the home directory of the user logged in to the router. In fact, the user's home directory is the default directory for most of the JUNOS software commands requiring a filename.

3. To view the contents of other file directories, specify the directory location. For example:

```
user@host> file list /config
juniper.conf
juniper.conf.1.gz
juniper.conf.2.gz
juniper.conf.3.gz
```

4. You can also use the router's context-sensitive help system to locate a directory. For example:

```
user@host> file list /?
Possible completions:
<[Enter]>   Execute this command
<path>     Path to list
/COPYRIGHT  Size: 4735, Last changed: Mar 31 2001
/altconfig/ Last changed: Dec 11 2001
/altroot/   Last changed: Dec 11 2001
/bin/       Last changed: Aug 26 08:49:25
/boot/      Last changed: Oct 03 16:27:55
/config/    Last changed: Oct 03 16:27:56
/dev/       Last changed: Sep 30 12:10:56
/etc/       Last changed: Oct 03 16:27:56
/kernel     Size: 9302545, Last changed: Apr 30 02:00:21
/mnt/       Last changed: Dec 11 2001
/modules/   Last changed: Aug 26 08:43:17
/packages/  Last changed: Aug 26 08:49:45
/proc/      Last changed: Oct 04 10:20:32
/root/      Last changed: Aug 26 08:47:33
/sbin/      Last changed: Aug 26 08:49:45
/tmp/       Last changed: Oct 03 16:27:55
/usr/       Last changed: Dec 11 2001
/var/       Last changed: Dec 27 2001
```

```
user@host> file list /var/?
Possible completions:
<[Enter]>   Execute this command
<path>     Path to list
/var/crash/ Last changed: Sep 16 09:03:30
/var/cron/  Last changed: Dec 27 2001
/var/db/    Last changed: Oct 03 16:27:56
/var/etc/   Last changed: Oct 03 16:27:56
/var/home/  Last changed: Oct 03 15:07:40
/var/log/   Last changed: Oct 03 16:27:56
/var/run/   Last changed: Oct 04 10:07:53
```

```

/var/sw/    Last changed: Dec 27 2001
/var/tmp/   Last changed: Sep 30 12:11:28

```

5. You can also display the contents of a file. For example:

```

user@host> file show /var/log/inventory
Jun 20 20:02:35 CHASSISD release 7.1I0 built by builder on 2005-04-29
07:59:59 UTC
Jun 20 20:02:57 CHASSISD release 7.1I0 built by builder on 2005-04-29
07:59:59 UTC
Jun 20 20:02:59 Routing Engine 0 - part number 740-003239, serial number
9001017848
Jun 20 20:04:00 SSB 0 - part number 710-001951, serial number AG1024
Jun 20 20:04:00 SSRAM bank 0 - part number 710-001385, serial number
214095
Jun 20 20:04:00 SSRAM bank 1 - part number 710-001385, serial number
214241
Jun 20 20:04:00 SSRAM bank 2 - part number 710-001385, serial number
214192
...

```

Specifying Filenames and URLs

In some command-line interface (CLI) commands and configuration statements—including `file copy`, `file archive`, `load`, `save`, `set system login user username authentication load-key-file`, and `request system software add`—you can include a filename. On a routing matrix, you can include chassis information as part of the filename (for example, `lcc0`, `lcc0-re0`, or `lcc0-re1`).

You can specify a filename or URL in one of the following ways:

- *filename*—File in the user's current directory on the local flash drive. You can use wildcards to specify multiple source files or a single destination file. Wildcards are not supported in Hypertext Transfer Protocol (HTTP) or FTP.



NOTE: Wildcards are supported only by the `file (compare | copy | delete | list | rename | show)` commands. When you issue the `file show` command with a wildcard, it must resolve to one filename.

- *path/filename*—File on the local flash disk.
- */var/filename* or */var/path/filename*—File on the local hard disk. You can also specify a file on a local Routing Engine for a specific T640 routing node on a routing matrix:

```

user@host> file delete lcc0-re0:/var/tmp/junk

```

- *a:filename* or *a:path/filename*—File on the local drive. The default path is / (the root-level directory). The removable media can be in MS-DOS or UNIX (UFS) format.
- *hostname:/path/filename*, *hostname:filename*, *hostname:path/filename*, or *scp://hostname/path/filename*—File on an scp/ssh client. This form is not available in the worldwide version of the JUNOS software. The default path is the user's home directory on the remote system. You can also specify *hostname* as *username@hostname*.
- *ftp://hostname/path/filename*—File on an FTP server. You can also specify *hostname* as *username@hostname* or *username:password@hostname*. The default path is the user's home directory. To specify an absolute path, the path must start with %2F; for example, *ftp://hostname/%2Fpath/filename*. To have the system prompt you for the password, specify **prompt** in place of the password. If a password is required, and you do not specify the password or **prompt**, an error message is displayed:

```

user@host> file copy ftp://username@ftp.hostname.net//filename
file copy ftp.hostname.net: Not logged in.
user@host> file copy ftp://username:prompt@ftp.hostname.net//filename
Password for username@ftp.hostname.net:

```

- *http://hostname/path/filename*—File on an HTTP server. You can also specify *hostname* as *username@hostname* or *username:password@hostname*. If a password is required and you omit it, you are prompted for it.
- *re0:/path/filename* or *re1:/path/filename*—File on a local Routing Engine. You can also specify a file on a local Routing Engine for a specific T640 routing node on a routing matrix:

```

user@host> show log lcc0-re1:chassisd

```

Managing Programs and Processes

This section shows some examples of operational commands you can use to manage programs and processes on the router.

Topics include:

- Displaying JUNOS Software Information on page 66
- Showing Software Processes on page 68
- Restarting a JUNOS Software Process on page 69
- Stopping the JUNOS Software on page 71
- Rebooting the JUNOS Software on page 72

Displaying JUNOS Software Information

You can display JUNOS software version information and other status to determine if the version of JUNOS software that you are running supports particular features or hardware.

To display JUNOS software information:

1. Make sure you are in operational mode.
2. To display brief information and status for the kernel and Packet Forwarding Engine, type the following command:

```
user@host> show version brief
```

This command shows version information for the JUNOS software packages installed on the router. For example:

```
Model: m160
JUNOS Base OS boot [8.1R1.0]
JUNOS Base OS Software Suite [8.1R1.0]
JUNOS Kernel Software Suite [8.1R1.0]
JUNOS Packet Forwarding Engine Support (M160) [8.1R1.0]
JUNOS Routing Software Suite [8.1R1.0]
JUNOS Online Documentation [8.1R1.0]
JUNOS Crypto Software Suite [8.1R1.0]
JUNOS Support Tools Package [8.1R1.0]
```

If the **JUNOS Crypto Software Suite** is listed, the router has Canada and USA encrypted JUNOS software. If the **JUNOS Crypto Software Suite** is not listed, the router is running worldwide nonencrypted JUNOS software.

- To display detailed version information, type the following command:

```
user@host> show version detail
```

This command displays shows the hostname and version information for the JUNOS software packages installed on your router. It also includes the version information for each software process. For example:

```

Hostname: my-router.net
Model: m160
JUNOS Base OS boot [8.1R1.0]
JUNOS Base OS Software Suite [8.1R1.0]
JUNOS Kernel Software Suite [8.1R1.0]
JUNOS Packet Forwarding Engine Support (M20/M40) [8.1R1.0]
JUNOS Routing Software Suite [8.1R1.0]
JUNOS Online Documentation [8.1R1.0]
JUNOS Crypto Software Suite [8.1R1.0]
JUNOS Support Tools Package [8.1R1.0]
jpf-common: JUNOS Packet Forwarding Engine Support (M/T Common) [8.1R1.0]
systestelf.pkg: labpkg [7.0]
KERNEL 8.1R1.0 #0 built by builder on 2005-12-15 22:42:19 UTC
MGD release 8.1R1.0 built by builder on 2005-12-15 22:42:50 UTC
CLI release 8.1R1.0 built by builder on 2005-12-15 22:42:29 UTC
CHASSISD release 8.1R1.0 built by builder on 2005-12-15 22:31:33 UTC
DFWD release 8.1R1.0 built by builder on 2005-12-15 22:33:30 UTC
DCD release 8.1R1.0 built by builder on 2005-12-15 22:30:31 UTC
RPD release 8.1R1.0 built by builder on 2005-12-15 22:43:01 UTC
SNMPD release 8.1R1.0 built by builder on 2005-12-15 22:36:55 UTC
MIB2D release 8.1R1.0 built by builder on 2005-12-15 22:35:10 UTC
APSD release 8.1R1.0 built by builder on 2005-12-15 22:31:27 UTC
VRRPD release 8.1R1.0 built by builder on 2005-12-15 22:37:27 UTC
ALARMD release 8.1R1.0 built by builder on 2005-12-15 22:31:21 UTC
PFED release 8.1R1.0 built by builder on 2005-12-15 22:35:59 UTC
CRAFTD release 8.1R1.0 built by builder on 2005-12-15 22:33:14 UTC
SAMPLED release 8.1R1.0 built by builder on 2005-12-15 22:36:45 UTC
ILMID release 8.1R1.0 built by builder on 2005-12-15 22:34:47 UTC
RMOPD release 8.1R1.0 built by builder on 2005-12-15 22:36:27 UTC
COSD release 8.1R1.0 built by builder on 2005-12-15 22:33:01 UTC
KMD release 8.1R1.0 built by builder on 2005-12-15 22:27:33 UTC
FSAD release 8.1R1.0 built by builder on 2005-12-15 22:34:10 UTC
IRSD release 8.1R1.0 built by builder on 2005-12-15 22:34:51 UTC
NASD release 8.1R1.0 built by builder on 2005-12-15 22:35:53 UTC
FUD release 8.1R1.0 built by builder on 2005-12-15 22:34:14 UTC
PPMD release 8.1R1.0 built by builder on 2005-12-15 22:42:57 UTC
LMPD release 8.1R1.0 built by builder on 2005-12-15 22:42:44 UTC
RTSPD release 8.1R1.0 built by builder on 2005-12-15 22:36:39 UTC
SMARTD release 8.1R1.0 built by builder on 2005-12-15 22:30:06 UTC
KSYNCD release 8.1R1.0 built by builder on 2005-12-15 22:34:59 UTC
LRMUXD release 8.1R1.0 built by builder on 2005-12-15 22:42:47 UTC
SPD release 8.1R1.0 built by builder on 2005-12-15 22:37:12 UTC
ECCD release 8.1R1.0 built by builder on 2005-12-15 22:34:09 UTC
PGMD release 8.1R1.0 built by builder on 2005-12-15 22:42:55 UTC
BFDD release 8.1R1.0 built by builder on 2005-12-15 22:42:26 UTC
L2TPD release 8.1R1.0 built by builder on 2005-12-15 22:37:33 UTC
HTTPD release 8.1R1.0 built by builder on 2005-12-15 22:27:29 UTC
SDXD release 8.1R1.0 built by builder on 2005-12-15 22:28:01 UTC
---(more)---
```

Showing Software Processes

To verify system operation or to begin diagnosing an error condition, you may need to display information about software processes running on the router.

To show software processes:

1. Make sure you are in operational mode.
2. Type the following command:

```
user@host> show system processes extensive
```

This command shows the central processing unit (CPU) utilization on the router and lists the processes in order of CPU utilization. For example:

```
last pid: 750; load averages: 0.00, 0.00, 0.00 up 0+00:58:50 18:34:17
52 processes: 1 running, 51 sleeping
Mem: 50M Active, 19M Inact, 38M Wired, 264K Cache, 86M Buf, 642M Free
Swap: 768M Total, 768M Free
```

PID	USERNAME	PRI	NICE	SIZE	RES	STATE	TIME	WCPU	CPU	COMMAND
546	root	10	0	9096K	1720K	nanslp	0:21	0.00%	0.00%	chassisd
685	root	2	0	12716K	3840K	kqread	0:01	0.00%	0.00%	rpd
553	root	2	0	8792K	1544K	select	0:01	0.00%	0.00%	mib2d
552	root	2	0	8632K	1556K	select	0:01	0.00%	0.00%	snmpd
563	root	2	0	9316K	1564K	select	0:00	0.00%	0.00%	kmd
564	root	2	0	7736K	948K	select	0:00	0.00%	0.00%	fud
131	root	10	0	770M	25568K	mfsidl	0:00	0.00%	0.00%	newfs
547	root	2	0	7732K	888K	select	0:00	0.00%	0.00%	alarmd
545	root	2	0	10292K	2268K	select	0:00	0.00%	0.00%	dcd
550	root	2	-12	1308K	692K	select	0:00	0.00%	0.00%	ntpd
1	root	10	0	816K	520K	wait	0:00	0.00%	0.00%	init
750	root	32	0	21716K	828K	RUN	0:00	0.00%	0.00%	top
560	root	2	0	8208K	1088K	select	0:00	0.00%	0.00%	rmopd
561	root	2	0	8188K	1156K	select	0:00	0.00%	0.00%	cosd
559	root	2	0	1632K	840K	select	0:00	0.00%	0.00%	ilmid

Table 9 lists and describes the output fields included in this example. The fields are listed in alphabetical order.

Table 9: show system processes Command Extensive Output Fields

Field	Description
COMMAND	Command that is running.
CPU	Raw (unweighted) CPU usage. The value of this field is used to sort the processes in the output.
last pid	Last process identifier assigned to the process.
load averages	Three load averages, followed by the current time.
Mem	Information about physical and virtual memory allocation.
NICE	UNIX “nice” value. The nice value allows a process to change its final scheduling priority.
PID	Process identifier.
PRI	Current kernel scheduling priority of the process. A lower number indicates a higher priority.
processes	Number of existing processes and the number of processes in each state (sleeping, running, starting, zombies, and stopped).
RES	Current amount of resident memory, in KB.
SIZE	Total size of the process (text, data, and stack), in KB.
STATE	Current state of the process (sleep, wait, run, idle, zombi, or stop).
Swap	Information about physical and virtual memory allocation.
USERNAME	Owner of the process.
WCPU	Weighted CPU usage.

Restarting a JUNOS Software Process

To correct an error condition, you may need to restart a software process running on the router.

To restart a software process:

1. Make sure you are in operational mode.
2. Type the following command:

```
user@host> restart <process>
```

Where <process> is the name of the process you want to restart. For example:

```
user@host> restart routing
Routing protocol daemon started, pid 751
```

This command restarts the routing protocol daemon. When a process restarts, the process identification (PID) is updated. (See Figure 13 on page 70.)

Figure 13: Restarting a Process

PID	USERNAME	PRI	NICE	SIZE	RES	STATE	TIME	WCPU	CPU	COMMAND
546	root	10	0	9096K	1720K	nanslp	0:21	0.00%	0.00%	chassisd
685	root	2	0	12716K	3840K	kqread	0:01	0.00%	0.00%	rpd
553	root	2	0	8792K	1544K	select	0:01	0.00%	0.00%	mib2d

PID before restart

547	root	2	0	7732K	888K	select	0:00	0.00%	0.00%	alarmd
545	root	2	0	10292K	2268K	select	0:00	0.00%	0.00%	dcd
1	root	10	0	816K	520K	wait	0:00	0.00%	0.00%	init
550	root	2	-12	1308K	692K	select	0:00	0.00%	0.00%	ntpd
758	root	32	0	21716K	832K	RUN	0:00	0.00%	0.00%	top
560	root	2	0	8208K	1088K	select	0:00	0.00%	0.00%	rmopd
561	root	2	0	8188K	1156K	select	0:00	0.00%	0.00%	cosd
559	root	2	0	1632K	840K	select	0:00	0.00%	0.00%	ilmid
573	lab	2	0	7480K	2580K	select	0:00	0.00%	0.00%	cli
751	root	2	0	12716K	3944K	kqread	0:00	0.00%	0.00%	rpd
558	root	2	20	8708K	1880K	select	0:00	0.00%	0.00%	sampled
555	root	2	0	1856K	932K	select	0:00	0.00%	0.00%	vrpdp
686	root	2	0	7808K	940K	select	0:00	0.00%	0.00%	apspd

PID after restart

Table 10 shows options available for the restart command.

Table 10: Options to Restart a JUNOS Software Process

Option	Description
class-of-service	Restart the class-of-service process, which controls the router's class-of-service configuration.
gracefully	Restart the software process by sending the equivalent of a UNIX SIGTERM signal.
immediately	Immediately restart the process by sending the equivalent of a UNIX SIGKILL signal.
interface-control	Restart the interface process, which controls the router's physical interface devices and logical interfaces.
mib-process	Restart the Management Information Base (MIB) II process, which provides the router's MIB II agent.
network-access-service	Restart the network access process, which provides the router's Challenge Handshake Authentication Process (CHAP) authentication service.
remote-operations	Restart the remote operations process, which provides the ping and traceroute MIBs.
routing	Restart the routing protocol process, which controls the routing protocols that run on the router and maintains the routing tables.
sampling	Restart the sampling process, which performs packet sampling and cflowd export.

Option	Description
snmp	Restart the Simple Network Management Process (SNMP) process, which provides the router's SNMP master agent.
soft	Reread and reactivate the configuration without completely restarting the software processes. For example, Border Gateway Protocol (BGP) peers stay up and the routing table stays constant. This option is the equivalent of a UNIX SIGHUP signal; omitting this option is the equivalent of a UNIX SIGTERM (kill) operation.

Stopping the JUNOS Software

To avoid damage to the file system, you must gracefully shut down the JUNOS software before powering off the router.

To stop the JUNOS software:

1. Make sure you are in operational mode.
2. Type the following command:

```
user@host> request system halt
```

This command stops all system processes and halts the operating system. For example:

```
user@host> request system halt
Halt the system? [yes,no] (no) yes
shutdown: [pid 3110]
Shutdown NOW!

*** FINAL System shutdown message from root@host ***
System going down IMMEDIATELY

user@host> Dec 17 17:28:40 init: syslogd (PID 2514) exited with status=0
Normal Exit
Waiting (max 60 seconds) for system process `bufdaemon' to stop...stopped
Waiting (max 60 seconds) for system process `syncer' to stop...stopped
syncing disks... 4
done
Uptime: 3h31m41s
ata0: resetting devices.. done
The operating system has halted.
Please press any key to reboot.
```

Rebooting the JUNOS Software

After a software upgrade or to recover (occasionally) from an error condition, you will need to reboot the JUNOS software.

To reboot the JUNOS software:

1. Make sure you are in operational mode.
2. Type the following command:

```
user@host> request system reboot
```

This command displays the final stages of the system shutdown and executes the reboot. Reboot requests are recorded to the system log files, which you can view with the `show log messages` command. For example:

```
Reboot the system? [yes,no] (no) yes

shutdown: [pid 845]
Shutdown NOW!

*** FINAL System shutdown message from root@host ***
System going down IMMEDIATELY

user@host> Dec 17 17:34:20 init: syslogd (PID 409) exited with status=0
Normal Exit
Waiting (max 60 seconds) for system process `bufdaemon' to stop...stopped
Waiting (max 60 seconds) for system process `syncer' to stop...stopped
syncing disks... 10 6
done
Uptime: 2m45s
ata0: resetting devices.. done
Rebooting...
```

Using the Comment Character

You can copy operational mode commands that include comments from a file and paste them into the CLI. A pound sign (#) at the beginning of the command line indicates a comment line. This is useful for describing frequently used operational mode commands; for example, a user's work instructions on how to monitor the network. To add a comment to a command file, the first character of the line must be #. When you start a command with #, the rest of the line is disregarded by the JUNOS software.

To add comments in operational mode, start with a # and end with a new line (carriage return):

```
user@host> # comment-string
```

comment-string is the text of the comment. The comment text can be any length, and you must type it on a single line.

Example: Using Comments

```

File with Comments      #Command 1: Show the router version
                           show version
                           #Command 2: Show all router interfaces
                           show interfaces terse

Copy and Paste
Contents of the File into
the CLI                user@host> #Command 1: Show the router version

                           user@host> show version
                           Hostname: myhost
                           Model: m5
                           JUNOS Base OS boot [6.4-20040511.0]
                           JUNOS Base OS Software Suite [6.4-20040511.0]
                           JUNOS Kernel Software Suite [6.4-20040511.0]
                           JUNOS Packet Forwarding Engine Support (M5/M10) [6.4-20040511.0] JUNOS
                           Routing Software Suite [6.4-20040511.0] JUNOS Online Documentation
                           [6.4-20040511.0] JUNOS Crypto Software Suite [6.4-20040511.0]

                           user@host> # Command 2: Show all router interfaces
                           user@host> show interfaces terse
                           Interface          Admin Link      Proto Local          Remote
                           fe-0/0/0           up   up
                           fe-0/0/1           up   down
                           fe-0/0/2           up   down
                           mo-0/1/0           up
                           mo-0/1/0.16383     up   up           inet 10.0.0.1     -> 10.0.0.17
                           so-0/2/0           up   up
                           so-0/2/1           up   up
                           dsc                 up   up
                           fxp0               up   up
                           fxp0.0             up   up           inet 192.168.70.62/21
                           fxp1               up   up
                           fxp1.0             up   up           tnp 4
                           gre                 up   up
                           ipip               up   up
                           lo0                up   up
                           lo0.0              up   up           inet 127.0.0.1     -> 0/0
                           lo0.16385         up   up           inet inet6

```

