

M40e and M160 SFM Installation Instructions

Part No. 530-007194-01
Revision 1
21 January 2002

This document describes how to remove and replace a Switching and Forwarding Module (SFM) in a Juniper Networks M40e Internet router or M160 Internet router.

For additional installation and configuration information, see the following documentation:

- *M40e Internet Router Hardware Guide*
- *M160 Internet Router Hardware Guide*
- *JUNOS Internet Software Operational Mode Command Reference*
- JUNOS Internet software configuration guides

Contents	SFM Description	1
	SFM Components	2
	SFMs on the M40e Router	3
	SFMs on the M160 Router	4
	Tools and Parts Required	4
	Replace an SFM	4
	Remove an SFM	4
	Install an SFM	5
	Contact Juniper Networks	7

SFM Description

The Switching and Forwarding Module (SFM) performs route lookup, filtering, and switching on incoming data packets, then directs outbound packets to the appropriate FPC for transmission to the network. An SFM can process 40 million packets per second (Mpps).

The ASICs on the SFM provide the following functions:

- Route lookups—The Internet Processor II ASIC on the SFM performs route lookups using the forwarding table stored in the synchronous SRAM (SSRAM) on the SFM.
- Management of shared memory on the FPCs—One Distributed Buffer Manager ASIC on the SFM receives the 64-byte data cells into which the I/O Manager ASICs on the FPCs divide incoming packets, and uniformly allocates them throughout the shared memory buffers located on the FPCs.

- Transfer of outgoing data packets to the FPCs—The second Distributed Buffer Manager ASIC on the SFM passes notification of the forwarding decision for each packet to the I/O Manager ASIC on the appropriate FPC so that the outgoing packet can be reassembled for transmission to the network.
- Transfer of exception and control packets—The Internet Processor II ASIC passes exception packets to the microprocessor on the SFM, which processes almost all of them. The SFM sends any remaining exception packets to the Routing Engine for further processing. When the SFM detects an error originating in the Packet Forwarding Engine, it sends it to the Routing Engine using system logging (syslog) messages.

SFM Components

Each SFM is a two-board system, as shown in Figure 1. It has the following components:

- Two Distributed Buffer Manager ASICs—Process incoming and outgoing packets: one distributes data cells (which the I/O Manager ASIC on each FPC derives from incoming packets) to the shared memory buffers on the FPCs, while the second forwards notification of routing decisions to the I/O Manager ASIC.
- One Internet Processor II ASIC—Performs route lookups and makes routing decisions.
- 8 MB of parity-protected SSRAM—Stores the forwarding table.
- Processor subsystem—Manages SFM functions and handles exception packets. The processor has the following components:
 - One PowerPC 603e processor
 - 256 KB of parity-protected Level 2 cache
 - 64 MB of parity-protected DRAM
- EEPROM—Stores the serial number and revision level.
- Two LEDs—Indicate SFM status. There is a green one labeled **OK** and an amber one labeled **FAIL**. Table 1 describes LED states.
- Offline button—Prepares the SFM for removal from the router when pressed.
- Ejector handles and locking tabs—Control the locking system that secures the SFM in the chassis.

Figure 1: Switching and Forwarding Module

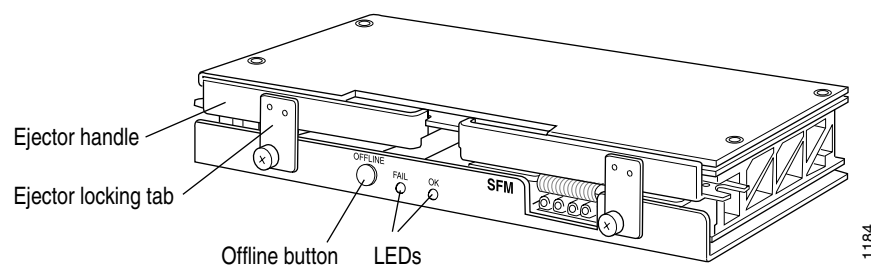


Table 1: States for SFM LEDs

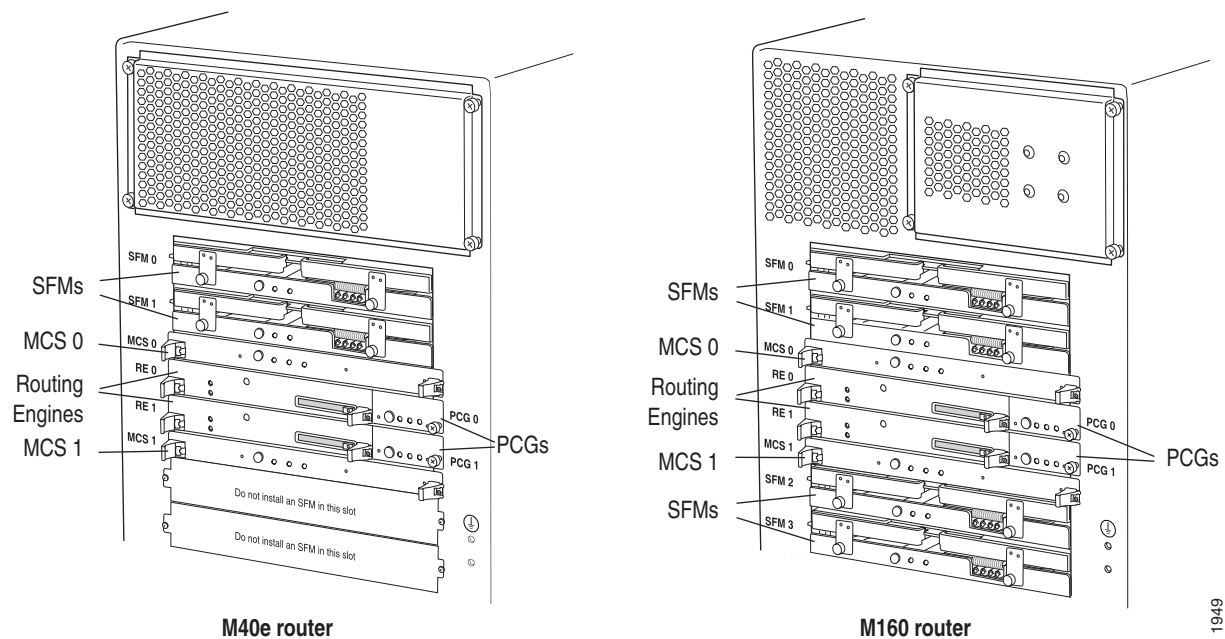
Label	Color	State	Description
OK	Green	On steadily	SFM is functioning normally.
		Blinking	SFM is starting up.
FAIL	Amber	On steadily	SFM has failed.

SFM on the M40e Router

On the M40e router, one or two SFMs can be installed into the midplane from the rear of the chassis, as shown in Figure 2. Only one SFM is active at a time, with the optional second SFM in standby mode. SFMs are hot-pluggable on the M40e router. Removing the standby SFM has no effect on router function. If the active SFM fails or is removed from the chassis, the effect depends on whether two SFMs are installed:

- If there is only one SFM, forwarding halts until the SFM is replaced and functioning again.
- If there are two SFMs, forwarding halts until the standby SFM boots and becomes active.

It takes approximately one minute for the new SFM to become active; synchronizing router configuration information can take additional time, depending on the complexity of the configuration.

Figure 2: Rear of Chassis with Component Cover Removed

SFMs on the M160 Router

On the M160 router, up to four SFMs can be installed into the midplane from the rear of the chassis, as shown in Figure 2. All SFMs are active and interconnected; if four SFMs are installed, together they can forward 160 Mpps.

The SFMs are hot-removable and hot-insertable on the M160 router. Inserting or removing an SFM interrupts forwarding for about 500 ms as the Packet Forwarding Engine reconfigures the distribution of packets across the remaining SFMs.

Tools and Parts Required

To replace an SFM, you need the following tools and parts:

- Phillips (+) screwdrivers, numbers 1 and 2
- Electrostatic bag or antistatic mat, one for each SFM removed
- ESD grounding wrist strap

Replace an SFM

An M40e router can have an SFM in each of the slots labeled **SFM0** and **SFM1** at the rear of the chassis, and an M160 router can have an SFM in each of the slots labeled **SFM0**, **SFM1**, **SFM2**, and **SFM3**. See Figure 2. Each SFM weighs approximately 5 lb (2.3 kg).

To replace an SFM, perform the following procedures:

- Remove an SFM on page 4
- Install an SFM on page 5

Remove an SFM

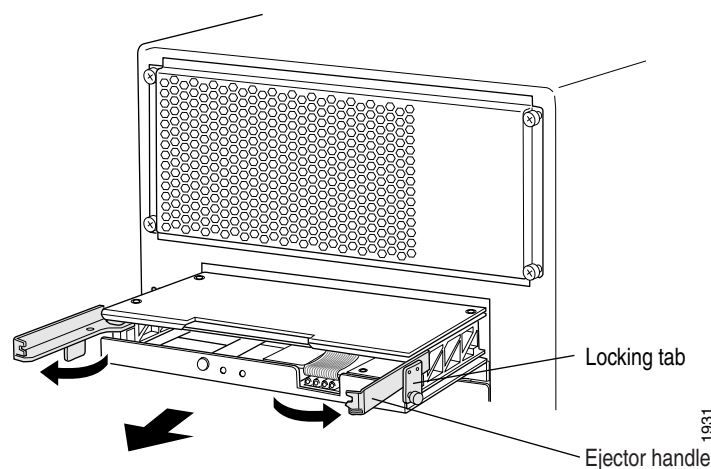
To remove an SFM, follow this procedure:

1. Place an electrostatic bag or antistatic mat on a flat, stable surface to receive the SFM.
2. Attach an ESD strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
3. Remove the rear component cover by loosening the thumbscrews at its corners and pulling it straight off of the chassis.
4. If the green LED labeled **OK** on the SFM faceplate is lit, press and hold the offline button on the SFM faceplate until the amber LED labeled **FAIL** lights, which takes about 5 seconds.

(If you are removing the active SFM on an M40e router, the effect depends on whether a standby SFM is already installed. For more information, see “SFMs on the M40e Router” on page 3.)

5. Loosen the thumbscrews on the ejector locking tabs that connect the two boards of the SFM (shown in Figure 1), using a Phillips screwdriver if necessary.
6. Flip the ends of the ejector handles outward (see Figure 3).
7. Grasp the handles and pull firmly to slide the unit about three-fourths of the way out of the chassis.
8. Place one hand under the SFM to support it, slide it completely out of the chassis, and place it on the antistatic mat or in the electrostatic bag prepared in Step 1.

Figure 3: Remove an SFM



Install an SFM

To install an SFM, follow this procedure (see Figure 4):

1. Attach an ESD strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
2. Place one hand under the SFM to support it and grasp one of the ejector handles at the front with the other hand.
3. Align the rear of the SFM with the guides inside the chassis and slide it in completely.
4. Press the ejector handles on the left and right sides of the SFM inward.
5. Tighten the thumbscrews on the ejector locking tabs (shown in Figure 1).

6. Press the offline button on the SFM faceplate and hold it down until the green LED labeled **OK** lights steadily, which takes about 5 seconds.

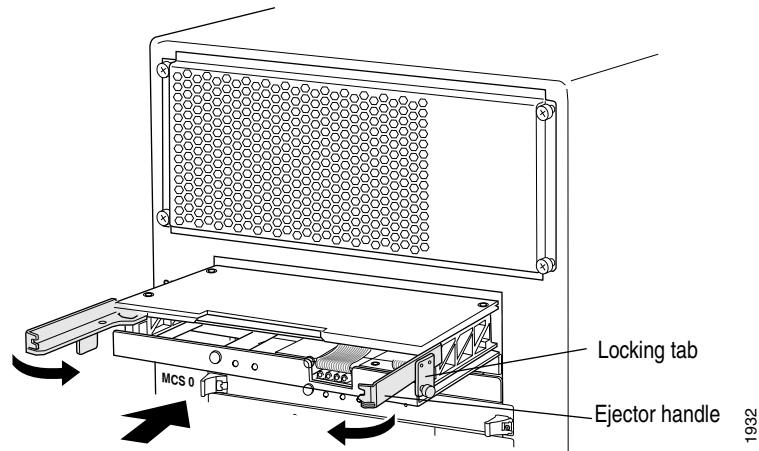
You can also issue the following CLI commands to check the status of the SFMs:

```
user@host> show chassis sfm
user@host> show chassis sfm detail
```

On the M40e router, the active SFM is marked as **Online**, and the standby SFM as **Offline**. On the M160 router, each functioning SFM is marked as **Online**, and SFMs in an inactive or failure state as **Offline**. For further information, see the *JUNOS Internet Software Operational Mode Command Reference*.

7. Reinstall the rear component cover and tighten the thumbscrews at the corners to secure it to the chassis.

Figure 4: Install an SFM



Contact Juniper Networks

For technical support, contact Juniper Networks at support@juniper.net. If you are reporting a software problem, please issue the following command from the CLI before contacting support:

```
user@host> request support information | save filename
```

For documentation issues, contact Juniper Networks at tech-doc@juniper.net.

To provide a core file to Juniper Networks for analysis, **gzip** the file, rename the file to include your company name, copy it to [ftp.juniper.net:pub/incoming](ftp://ftp.juniper.net/pub/incoming), and then send the filename, along with software version information (the output of the **show version** command) and the configuration, to support@juniper.net.

Juniper Networks is a registered trademark of Juniper Networks, Inc. Internet Processor, Internet Processor II, JUNOS, JUNOScript, M5, M10, M20, M40, M40e, and M160 are trademarks of Juniper Networks, Inc. All other trademarks, service marks, registered trademarks, or registered service marks may be the property of their respective owners. All specifications are subject to change without notice.

Copyright © 2002, Juniper Networks, Inc.
All rights reserved. Printed in USA.

