

M5 and M10 Routers FEB Replacement Instructions

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This document describes how to remove and replace a Forwarding Engine Board (FEB) in a Juniper Networks M5 or M10 Internet Backbone Router.

For additional installation and configuration information, refer to the following documentation:

- *M5 and M10 Internet Backbone Routers Hardware Installation Guide*
- *JUNOS Internet Software Configuration Guide*
- *JUNOS Internet Software Command Reference*

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FEB Description

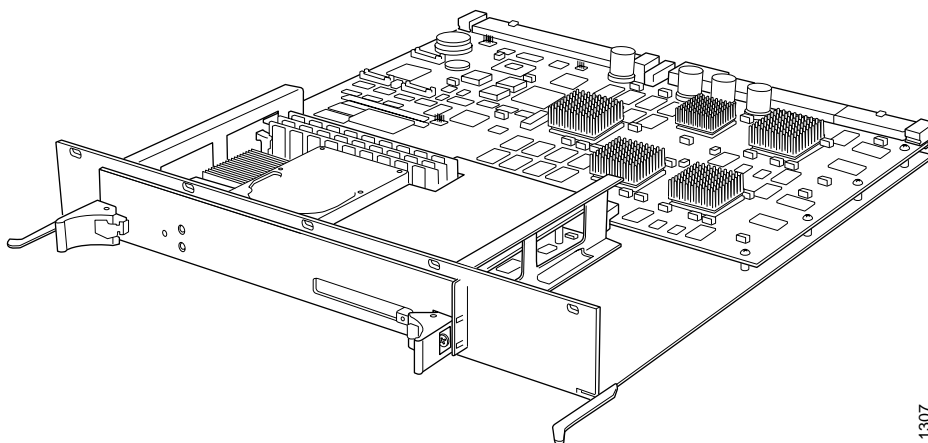
The Forwarding Engine Board (FEB) is located on the rear of the router above the power supplies (see Figure 1). It provides route lookup, filtering, and switching to the destination port. The FEB communicates with the Routing Engine using a dedicated 100-Mbps link to transfer routing table data from the Routing Engine to the forwarding table in the Internet Processor II ASIC, and transfer routing link-state updates and other packets destined for the router from the FEB to the Routing Engine. The FEB provides the following functions:

- Route lookups—The Internet Processor II ASIC on the FEB performs route lookups using the forwarding table stored in synchronous SRAM (SSRAM).
- Management of shared memory—One Distributed Buffer Manager ASIC on the FEB uniformly allocates incoming data packets throughout the router's shared memory.
- Transfer of outgoing data packets—A second Distributed Buffer Manager ASIC on the FEB passes data packets to the destination PIC when the data is ready to be transmitted.

- Transfer of exception and control packets—The Internet Processor II ASIC passes exception packets to the microprocessor on the FEB. Those not processed on the FEB are sent to the Routing Engine for further processing. Any errors originating in the Packet Forwarding Engine and detected by the FEB are sent to the Routing Engine using syslog messages.

The FEB is field-replaceable, but is not hot-removable or hot-pluggable. You must power down the router before removing or replacing the FEB.

Figure 1: Forwarding Engine Board



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FEB Components

The FEB has the following major components:

- Processing components
 - 266-MHz CPU and supporting logic
 - Internet Processor II ASIC
 - Two Distributed Buffer Manager ASICs
 - One (on the M5 router) or two (on the M10 router) I/O Manager ASICs, each with 1-MB SRAM
 - 33-MHz PCI bus—Connects the system ASICs
- Storage components
 - Four banks of 2-MB SRAM for forwarding tables associated with the ASICs
 - 64-MB DRAM for the microkernel
 - I²C EEPROM containing the serial number and revision level
 - Two 512-KB boot flash EPROMs (programmable on the board)

- System interfaces
 - 100-Mbps link for internal interface to the Routing Engine
 - 19.44-MHz reference clock for SONET PICs
 - I²C controller to read the I²C/EEPROMs in memory, the midplane, and the power supplies
- One PowerPC 603e processor
- Either 64-MB (on the M5 router) or 128-MB (on the M10 router) SDRAM—Used as shared memory by the Distributed Buffer Manager ASIC on the FEB

Tools and Parts Required

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

- Phillips (+) screwdrivers, numbers 1 and 2
- An electrostatic bag to store the removed FEB
- An antistatic mat, placed on a flat, stable surface
- An ESD grounding wrist strap

Power Down the Router

Before you remove the FEB, you must power down the router. To power down the router, follow this procedure:

1. From the CLI, enter the **request system halt** command. This stops packet forwarding.
2. Wait for the “System halted” message on the console.
3. Turn off power to the router. For AC or DC power supplies, attach an ESD wrist strap to your bare wrist and connect the wrist strap to one of the two ESD points on the chassis. Locate the power switch and flip it to the off position.

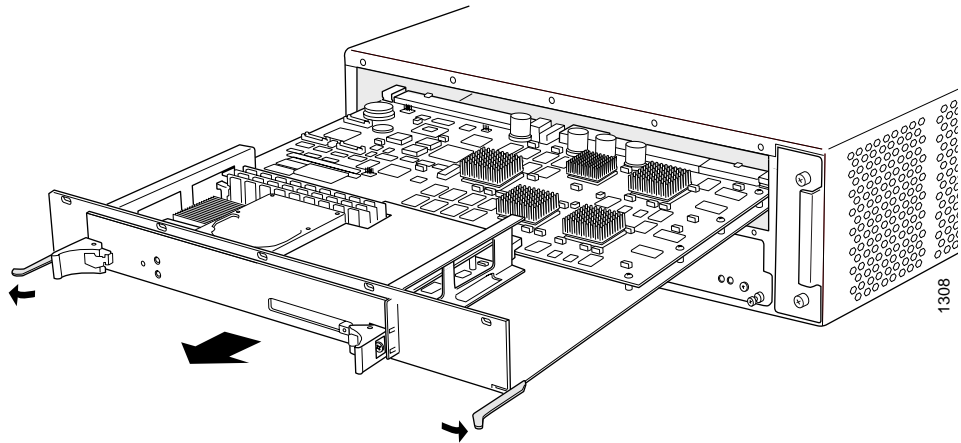
Remove the FEB

The FEB is located in the center rear of the chassis. It weighs approximately 7 lbs (3.2 kg).

To remove the FEB, follow this procedure (see Figure 2):

1. Attach an ESD wrist strap to your bare wrist and connect the wrist strap to one of the two ESD points on the chassis.
2. If the router is running, turn off power to the router. To power down the router, see “Power Down the Router” on page 3.
3. Unscrew the five screws holding the rear cover in place, and remove the cover. Be sure to save the screws for when you reinstall the cover.
4. Flip the ends of the two ejector levers towards the outside edges of the router.
5. Grasp both sides of the FEB and slide it about three quarters of the way out of the router.
6. Move one of your hands underneath the FEB to support it and slide it completely out of the chassis.

Figure 2: Remove the FEB



Install a Replacement FEB

You install the FEB into the rear of the chassis above the power supplies. To install the FEB, follow this procedure (see Figure 3):

1. Attach an ESD wrist strap to your bare wrist and connect the wrist strap to one of the two ESD points on the chassis.
2. Grasp the front of the FEB with both hands and align the rear of the FEB with the guides on the chassis.
3. To ensure proper seating of the ejector levers, move them to an outward position slightly less than perpendicular to the faceplate before seating the FEB in the slot.

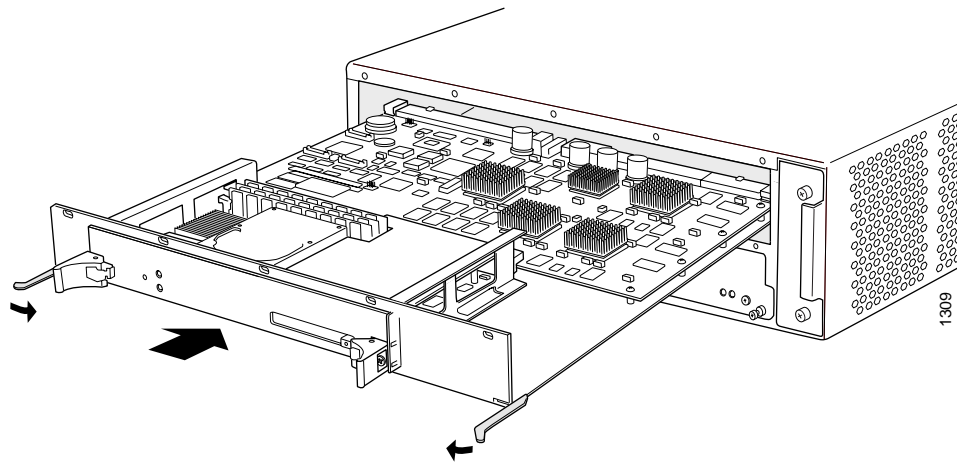
4. Slide the FEB all the way into the chassis until it contacts the midplane.
5. Grasp the ejector levers and carefully push the FEB to seat it onto the midplane.
6. Flip the ejector levers toward each other to lodge the FEB in place.
7. Press the rear cover into place over the FEB and the Routing Engine, and screw in the five screws to hold it in place.



To seat the FEB properly, be sure to tighten the screws adequately. If the FEB is not seated properly, it will not function.

8. Power up the router. To power up the router, see “Power Up the Router” on page 5.
9. For each PIC, push and hold the PIC online/offline button on the craft interface for five seconds to bring the PIC back online.

Figure 3: Install a Replacement FEB



Power Up the Router

To power up the router, follow this procedure:

1. Turn on the power to the management device that is connected to the Routing Engine through the **CONSOLE**, **MGMT**, or **AUX/MODEM** port.
2. Turn the power switch on each power supply to the **ON** position. The power supply **OUTPUT OK** LED should light steadily.
3. On the management device, monitor the startup process to verify that the system has booted properly.

Verify that the FEB is Installed Correctly

To verify that the FEB has been installed correctly, check the alarm LEDs on the craft interface after you have installed the FEB. An improperly functioning FEB can generate a red or yellow alarm, depending on the nature of the problem. If the FEB is not functioning normally, contact your customer service representative.

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.

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