



# Multi-Service Blade (MSB) Installation

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This hardware installation note contains instructions for installing and troubleshooting the Multi-Service Blade (MSB) on supported Cisco XR 12000 Series Routers.

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## Important Information

This section contains important information about the following:

- [MSB Product Numbers, page 2](#)
- [Router Hardware Installation, page 2](#)
- [Related Documentation, page 2](#)



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## MSB Product Numbers

This publication applies to the following products:

Card Name	Cisco Product Number
Multi-Service Blade (MSB)	XR-12K-MSB=

## Router Hardware Installation

For hardware installation and configuration information for Cisco XR 12000 Series Routers, refer to the installation and configuration guide for your router. The guide includes information on the router switch fabric and how it affects operation of the line cards, as well as line card slot locations, slot width, and other requirements.

Also refer to the field-replaceable unit (FRU) publications that describe how to install, maintain, and replace router subsystems, such as cooling fans, power supplies, chassis backplanes, and so on.

## Supported Platforms

The MSB is supported on all Cisco XR 12000 Series Routers.

## Related Documentation

This publication describes the basic installation and initial configuration of the MSB. The following documents provide complementary information:

- *Cisco IOS XR Release 3.4 Release Notes for Cisco XR 12000 Series Routers*
- *Cisco IOS XR Session Border Controller Configuration Guide*
- *Cisco IOS XR Session Border Controller Command Reference*
- *Regulatory Compliance and Safety Information for Cisco XR 12000 Series Routers*

See the “[Obtaining Documentation and Submitting a Service Request](#)” section on page 12 for information on how to obtain these publications.

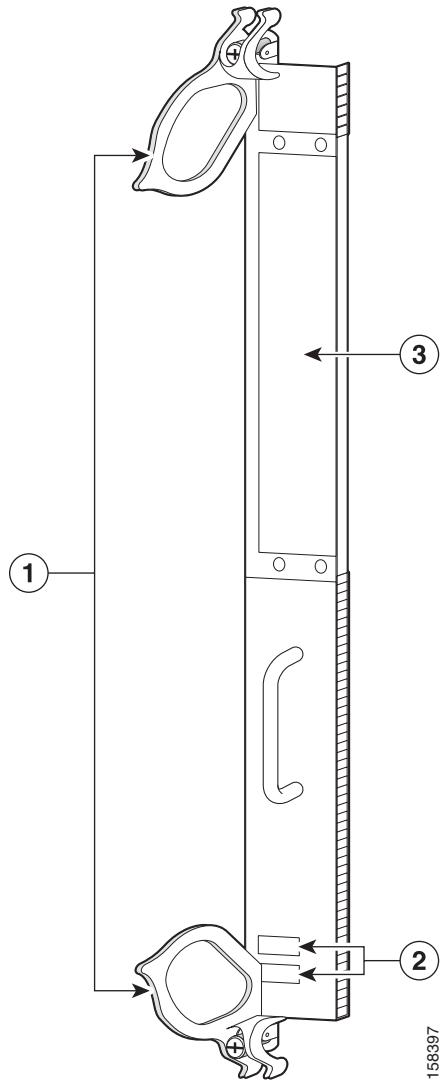
See [Cisco 12000 Series Routers Install and Upgrade Guides](#) for information on router installation procedures.

## MSB Overview

The MSB is a services card that provides the Cisco XR 12000 Series Router with a variety of edge services. The first service to be supported on the MSB as of Cisco IOS XR Release 3.4.0 is Session Border Controller (SBC). The alphanumeric LEDs provided an indication of the status of the card.

[Figure 1](#) shows the front view of the card.

**Figure 1** MSB Front Panel



<b>1</b>	Ejector levers	<b>3</b>	SPA subslot blank cover
<b>2</b>	Alphanumeric LEDs		

The MSB is shipped with a blank cover (XR-12K-MSB-BLANK) over the SPA subslot opening. Verify that the blank cover is in place before installing the MSB in the router.

## Preparing for Installation

The following sections provide information about preparing to install the MSB:

- [Safety Guidelines, page 4](#)
- [Preventing Electrostatic Discharge, page 4](#)
- [Required Tools and Equipment, page 4](#)

## Safety Guidelines

Before you perform any procedure in this publication, review the safety guidelines in this section to avoid injuring yourself or damaging the equipment.

The following guidelines are for your safety and to protect equipment. The guidelines do not include all hazards. Be alert.



**Note**

Review the safety warnings listed in the *Regulatory Compliance and Safety Information for Cisco 12000 Series Internet Router* publication (Document Number 78-4347-xx) that accompanied your router before installing, configuring, or maintaining a line card.

- Keep the work area clear and dust free during and after installation. Do not allow dirt or debris to enter into any laser-based components.
- Do not wear loose clothing, jewelry, or other items that could get caught in the router while working with line cards.
- Cisco equipment operates safely when it is used in accordance with its specifications and product usage instructions.

## Preventing Electrostatic Discharge

Electrostatic discharge (ESD) damage, which can occur when electronic cards or components are improperly handled, results in complete or intermittent failures. Electromagnetic interference (EMI) shielding is an integral component of the line card. Cisco recommends using an ESD-preventive strap whenever you are handling network equipment or one of its components.

The following are guidelines for preventing ESD damage:

- Always use an ESD-preventive wrist or ankle strap and ensure that it makes good skin contact. Connect the equipment end of the connection cord to an ESD connection socket on the router or to bare metal on the chassis.
- Handle MSBs by the captive installation screws, the provided handle, the ejector levers, or the line card metal carrier only; avoid touching the board or connector pins.
- Place removed MSBs board-side-up on an antistatic surface or in a static shielding bag. If you plan to return the component to the factory, immediately place it in a static shielding bag.
- Avoid contact between the MSBs and clothing. The wrist strap protects the board only from ESD voltages on the body; ESD voltages on clothing can still cause damage.



**Caution**

For safety, periodically check the resistance value of the ESD strap. The measurement should be between 1 and 10 megohms.

## Required Tools and Equipment

You need the following tools and parts to remove and install MSBs:

- Flat-blade or Phillips screwdriver
- ESD-preventive wrist or ankle strap and instructions



**Note** If you need additional equipment, see Cisco.com or your service representative for ordering information.

## Removing and Installing an MSB

The following sections provide procedures for removing or installing an MSB:

- [Guidelines for MSB Removal and Installation, page 5](#)
- [Removing an MSB, page 6](#)
- [Installing an MSB, page 7](#)



**Note** See the “[Guidelines for MSB Removal and Installation](#)” section on page 5 before removing an MSB while power to the router is on.

## Guidelines for MSB Removal and Installation

Guidelines for MSB removal and installation include the following:

- Online insertion and removal (OIR) is supported, enabling you to remove and install cards while the router is operating. OIR is seamless to users on the network, maintains all routing information, and ensures session preservation.
- After you reinstall an MSB, the router automatically downloads the necessary software from the route processor (RP).



**Caution** The router may indicate a hardware failure if you do not follow proper procedures. Remove or insert only one line card at a time. Allow at least 15 seconds for the router to complete the preceding tasks before removing or inserting another line card.

After removing and inserting a line card into the same slot, allow at least 60 seconds before removing or inserting another line card.

- MSB cards have two ejector levers to release the card from its backplane connector. Use the levers when you are removing the card and to seat the card firmly in its backplane connector when you are installing the MSB. The ejector levers align and seat the card connectors in the backplane.



**Caution** When you remove an MSB, always use the ejector levers to ensure that the connector pins disconnect from the backplane in the sequence expected by the router. Any card that is only partially connected to the backplane can halt the router.

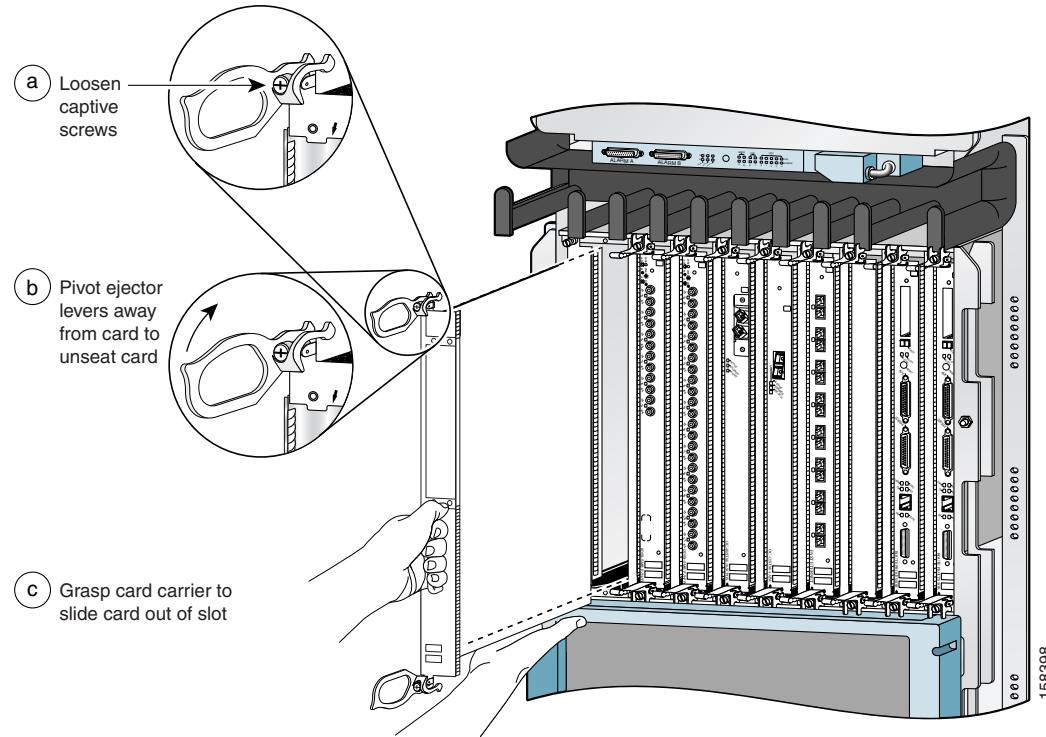
When you install an MSB, always use the ejector levers to ensure that the card is correctly aligned with the backplane connector; the connector pins should make contact with the backplane in the correct order, indicating that the card is fully seated in the backplane. If a card is only partially seated in the backplane, the router hangs and subsequently crashes.

## Removing an MSB

If you are replacing a failed MSB, remove the existing MSB first, then install the new MSB in the same slot. To remove an MSB, use [Figure 2](#) as a reference and follow these steps:

- 
- Step 1** Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.
  - Step 2** Use a screwdriver to loosen the captive screw at each end of the line card faceplate. (See [Figure 2a](#).)

**Figure 2** *Line Card Removal and Installation*



**Caution** When you remove an MSB, always use the ejector levers to ensure that the card connector pins disconnect from the backplane in the logical sequence expected by the router. Any card that is only partially connected to the backplane can halt the router.

- 
- Step 3** Simultaneously pivot the ejector levers away from each other to release the MSB from the backplane connector. (See [Figure 2b](#).)
  - Step 4** Grasp the ejector levers and pull the MSB halfway out of the slot.
  - Step 5** Grasp the MSB and gently pull it straight out of the slot, keeping your other hand under the card to guide it. (See [Figure 2c](#).) Avoid touching the MSB printed circuit board, components, or any connector pins.
  - Step 6** Place the removed MSB on an antistatic mat, or immediately place it in an antistatic bag if you plan to return it to the factory.

- Step 7** If the MSB slot is to remain empty, install a line card blank (Product Number MAS-GSR-BLANK) to keep dust out of the chassis and to maintain proper airflow through the line card compartment. Secure the line card blank to the chassis by tightening its captive screws.

## Installing an MSB

The MSB slides into almost any available line card slot and connects directly to the backplane. If you install a new MSB, you must first remove the line card blank from the available slot.



**Note**

Refer to the installation and configuration guide for your router for information on line card slot types, slot width, and slot location.



**Caution**

The router may indicate a hardware failure if you do not follow proper procedures. Remove or insert only one card at a time. Allow at least 15 seconds for the router to complete the preceding tasks before removing or inserting another line card.

To install the MSB, follow these steps:

**Step 1**

Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.

**Step 2**

Choose an available line card slot for the MSB.



**Caution**

To prevent ESD damage, handle cards by the captive installation screws, the provided handle, the ejector levers, or the card carrier edges only. Do not touch any of the electrical components or circuitry.

**Step 3**

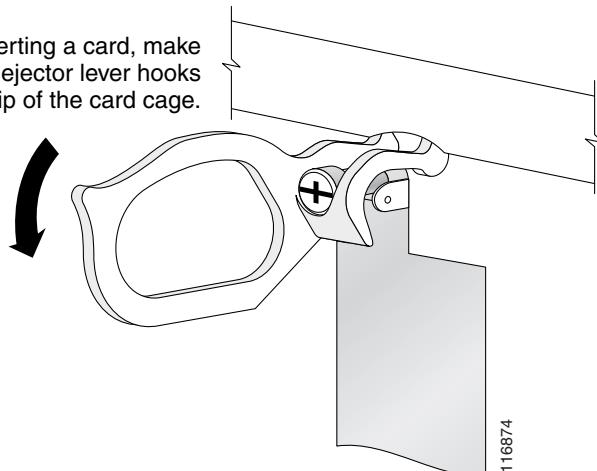
Grasp the faceplate (or handle) of the MSB with one hand and place your other hand under the card carrier to support the weight of the card; position the card for insertion into the card cage slot. Avoid touching the MSB printed circuit board, components, or any connector pins.

**Step 4**

Carefully slide the MSB into the slot until the ejector levers make contact with the edges of the card cage, then *stop* when the ejector lever hooks catch the lip of the card cage. If they do not catch, try reinserting the MSB until the ejector lever hooks are fully latched. (See [Figure 3](#).)

**Figure 3**      **Ejector Levers**

When inserting a card, make sure that the ejector lever hooks catch the lip of the card cage.



**Caution** When you install a MSB, always use the ejector levers to ensure that the card is correctly aligned with the backplane connector, that the card connector pins make contact with the backplane in the correct order, and that the card is fully seated in the backplane. A card that is only partially seated in the backplane can cause the router to hang and subsequently crash.

**Step 5** Simultaneously pivot both ejector levers toward each other until they are perpendicular to the MSB faceplate. This action firmly seats the card in the backplane.

**Step 6** Use a 3/16-inch flat-blade screwdriver to tighten the captive screw on each end of the MSB faceplate to ensure proper EMI shielding and to prevent the MSB from becoming partially dislodged from the backplane.



**Caution** To ensure adequate space for additional line cards, always tighten the captive installation screws on each newly installed card *before* you insert any additional cards. These screws also prevent accidental removal and provide proper grounding and EMI shielding for the router.

For information on verifying and troubleshooting the hardware installation, see the “[Verifying and Troubleshooting the MSB Installation](#)” section on page 8.

## Verifying and Troubleshooting the MSB Installation

The following sections describe how to verify and troubleshoot the MSB installation:

- [Initial Boot Process, page 9](#)
- [Alphanumeric LED Descriptions, page 9](#)
- [Troubleshooting the Installation, page 10](#)

## Initial Boot Process

During a typical MSB boot process, the following events occur:

1. The MSB maintenance bus (Mbus) module receives power and begins executing the Mbus software.
2. The MSB Mbus module determines the type of card on which it resides, performs internal checks, and prepares to accept the Cisco IOS XR software from the RP.
3. The RP powers up the MSB and loads it with its Cisco IOS XR software.

To verify that the MSB is working properly, perform the following operational check:

- During the MSB boot process, observe the alphanumeric LEDs to ensure that the card is running the typical initialization sequence. The sequence should end with “IOS-XR.”

If this condition is not met, refer to [Troubleshooting the Installation, page 10](#) to identify any possible problems.

## Alphanumeric LED Descriptions

The MSB includes an alphanumeric LED display consisting of four characters arranged in two rows (upper and lower). In general, the LEDs do not come on until the RP recognizes and powers up the card. As it boots, the line card displays a sequence of messages. [Table 1](#) lists the alphanumeric LED messages that may appear on the MSB.

**Table 1**      **Alphanumeric LED Messages**

Message	Description
Upper row: SP Lower row: RMON	Indicates that the SP processor of the CPU is booting up from ROMMON. This is the first step in card bringup.
Upper row: IOS- Lower row: XR	Indicates that the node is up and running.
Upper row: PRES Lower row: ENT	Indicates that the card is plugged in but is not booted (probably due to a configuration issue or some other issue with the card).
Upper row: IN-R Lower row: ESET	Indicates that the card either encountered critical alarms and, therefore, was shut down or failed the boot process and was shut down. Manual intervention is required to recover the card.
Upper row: ROMM Lower row: ON	Indicates the software state prior to the card booting.
Upper row: MBI- Lower row: BOOT	Indicates that the initial minimum boot image is loading on the card.
Upper row: MBI- Lower row: RUN	Indicates that the minimum boot image (MBI) is running and pulling the appropriate software packages from the active RP to the remote nodes.
Upper row: BRIN Lower row: GDOW	Indicates that the node is down (due to a user configuration or some other error).
Upper row: IOS- Lower row: XR F	Indicates an error that should shut down the card. However, the user has overridden the sequence through a configuration change. Hence, the fail state indicates an error on the card.

## Troubleshooting the Installation

The following sections provide MSB troubleshooting information:

- [Displaying Diagnostic Information, page 10](#)
- [Upgrading the FPD Version, page 10](#)

### Displaying Diagnostic Information

The **show diags** command can be used to indicate the status of a newly installed MSB. It indicates the ROMMON version, the fabric loader version, and the DRAM size, among other things. In the following example, this information is indicated in bold:

```
RP/0/0/CPU0:router# show diags 0/3/CPU0

SLOT 3 (RP/LC 3): Cisco 12000 Series - Service Engine Card
  MAIN: type 150, 800-25972-01 rev @6 dev 0
        HW config: 0x00      SW key: 00-00-00
  PCA: 73-9289-03 rev 81 ver 2
        HW version 1.0  S/N SAD10330584
  MBUS: Embedded Agent
        Test hist: 0x00      RMA#: 00-00-00      RMA hist: 0x00
  DIAG: Test count: 0x00000000      Test results: 0x00000000
  FRU: Linecard/Module: 12000-ServEngCard
  L3 Engine: Service Engine - ISE OC192 (10 Gbps)
  MBUS Agent Software version 2.49 (RAM) (ROM version is 3.3)
  Using CAN Bus A
ROM Monitor version 1.2
Fabric Downloader version used 1.4 (ROM version is 1.3)
  Primary clock is CSC1
  Board State is IOS-XR RUN
  Insertion time: Mon Sep 11 22:44:35 2006 (01:36:23 ago)
DRAM size: 2147483648 bytes
  FrFab SDRAM size: 1610612736 bytes
  ToFab SDRAM size: 268435456 bytes
  0 crashes since restart/fault forgive
```

### Upgrading the FPD Version

You must upgrade the field-programmable device (FPD) images on your MSB in the following instances:

- Migrate to a later Cisco IOS XR software release
- Swap MSB from a system running a different Cisco IOS XR software release
- Insert a new MSB

If there is an FPD incompatibility with your MSB, you may receive an error message. To resolve this issue, you must upgrade the FPD image on your card. Use the **upgrade hw-module fpd** command. For more information, see “*Upgrading FPD Images on Cisco IOS XR Software*” in *Cisco IOS XR Interface and Hardware Component Configuration Guide*.

# Regulatory, Compliance, and Safety Information

This section includes regulatory, compliance, and safety information in the following sections:

- [Translated Safety Warnings and Agency Approvals, page 11](#)
- [Regulatory Standards Compliance, page 11](#)

## Translated Safety Warnings and Agency Approvals

The complete list of translated safety warnings and agency approvals is available in the *Regulatory Compliance and Safety Information for Cisco XR 12000 Series Routers* publication.  
(Document Number 78-4347-xx.)

## Regulatory Standards Compliance

MSB complies with the national and international standards listed in [Table 2](#).

**Table 2 Regulatory Standards Compliance**

Category	Standard
Safety	UL/CSA/IEC/EN 60950-1 AS/NZS 60950
Electromagnetic Compliance (Emissions)	FCC 47 CFR Part 15 Class A ICES 003 Class A AS/NZS Class A CISPR 22 Class A EN55022 Class A VCCI Class A IEC/EN61000-3-2 Power Line Harmonics IEC/EN61000-3-3 Voltage Fluctuations and Flicker
Immunity (Basic Standards)	IEC/EN61000-4-2 Electrostatic Discharge Immunity (8kV contact, 15kV air) IEC/EN61000-4-3 Radiated Immunity (10V/m) IEC/EN61000-4-4 Electrical Fast Transient Immunity (2kV power, 1kV signal) IEC/EN61000-4-5 Surge AC Port (4kV CM, 2kV DM) IEC/EN61000-4-5 Surge DC Port (1kV) IEC/EN61000-4-6 Immunity to Conducted Disturbances (10Vrms) IEC/EN61000-4-8 Power Frequency Magnetic Field Immunity (30A/m) IEC/EN61000-4-11 Voltage Dips, Short Interruptions, and Voltage Variations
ETSI and EN	EN 300 386 Telecommunications Network Equipment (EMC) EN55022 Information Technology Equipment (Emissions) EN55024 Information Technology Equipment (Immunity) EN50082-1/EN61000-6-1 Generic Immunity Standard
NEBS	This product is designed to meet the following requirements (qualification complete or in progress): <ul style="list-style-type: none"> <li>• GR-1089-CORE, Issue #3 NEBS EMC and Safety</li> <li>• GR-63-CORE NEBS Physical Protection</li> <li>• SR-3580 NEBS Criteria Levels (Level 3)</li> </ul>

# Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

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