Enclosure and Card Installation

This chapter describes how to install the hardware components that make up an MGX 8850 switch.

Note Most of the information in this chapter applies to an open rack installation. For a Cisco rack, you need only the instructions that apply to electrical connections. Information about the Cisco rack itself appears in Chapter 3, “Site Preparation.”

Although the viewpoint of this chapter is that a plan exists for the network and the location of each card, it reviews some of the planning decisions for the switch. For a list of physical and electrical characteristics of the switch, see Appendix A, “System Specifications.”

Introductory Information

The MGX 8850 node ships in one of two arrangements:

• In pieces for installation in an open rack, which necessitates extensive installation instructions
• Pre-installed in a Cisco cabinet, which necessitates minimal installation instructions

Note the following information before installing anything:

• The card cage ships with cards and power modules installed and tested according to customer specifications. For an open rack installation, Cisco recommends that you remove the components before installing the switch because of the weight of the switch and the likelihood that a mechanical lift is not available. Therefore, the instructions begin with steps for removing cards and power modules on the assumption that no mechanical lift is available.
• High-speed, single-height service modules should be in the upper slots.
• Be sure to record the locations of all components.
• The maximum number of MGX 8850 nodes you can fit in a rack is two.
• If the installation includes a BPX 8600-series switch, it must reside at the bottom of the rack.

Installation Tools

The installation tools are:

• Small and medium-sized flat-blade and phillips screw drivers and optional powered screw driver.
• Optionally, a mechanical lift is helpful but a virtual necessity if only one person is installing the switch due to the weight of the card cage.
Mounting Rails for the Enclosure Modules

The minimum distance between left and right mounting rails as you face the rack is 17.75 inches or 45.08 cm. (The width of the enclosure modules such as card cage, fan tray, and so on, is 17.73 inches.) If a standard 19-inch (48.25 cm) rack cannot provide this space, a 23-inch rack is necessary. Each module has flanges that serve as the front mounting brackets in a 19-inch rack. For a 23-inch rack, Cisco Systems provides special brackets. The 19-inch rack version appears in Figure 4-1.

You can attach the enclosure modules to the mounting rails at the following points on the modules:

- At the front, using the front flanges on each module. The flanges are visible in Figure 4-1.
- Approximately at the node’s midpoint: attach brackets to the modules, then attach the modules to mounting rails. For 23-inch racks, use the special extension brackets.

The mounting rail locations comply with sites that require mounting on front, middle, and rear mounting rails, as Figure 4-2 shows.
Considerations for Mounting the MGX 8850 Modules

This section describes how to install the mandatory and optional modules that make up the enclosure of the MGX 8850 switch. For open rack installations, Cisco advises you to remove the cards and optional AC power supplies before installing the switch. Therefore, this section begins with the steps for removing and installing these items.

When you install the modules, keep in mind the following:

1. Due to the presence of a disk drive on each Processor Switching Module (PXM), you should leave the PXMs in place. If you remove a PXM, handle it with caution to preserve disk alignment.

2. For an AC-powered, mid-mount rack installation, you must remove the AC power supplies.

3. The weight and bulk of even an empty card cage mandate that two or more people install it, otherwise one person with a mechanical lift can install the node.

4. As you place each module in the rack, be sure that it does not drag across the surface of the module beneath it. Therefore, as you move it into position towards the back of the rack, lower the module to rest only when it is all the way in the rack and directly above the module beneath it.

5. The vertical spacing between all modules must be in the range .047”–.077” (about 1/16”) or 0.119 cm–0.196 cm. By leaving this space, you can easily remove a single module if necessary. This clearance is not necessary beneath the exhaust plenum.

6. Two installers can maneuver a module to provide the vertical gap while driving in the first two screws. If you alone are installing the modules, use a non-abrasive object to create this gap until you have installed the screws. For the modules that have four or eight screws, two people are required only until the bottom two screws are in place.

7. If an enclosure module takes more than two screws, install the two bottom screws first.

8. If space around a mid-mount installation is too narrow, you can use thread-forming screws to pre-thread mounting holes. The pre-threaded holes make screw insertion much easier.
Caution  If you use a power-screwdriver, do not use it on any of the captive screws.

Caution  When moving a Cisco-supplied cabinet, do not push the cabinet at its sides. Instead, grip its front or back edges.

Caution  Make sure that mounting the equipment does not create a hazardous condition due to uneven mechanical loading. The equipment rack should be securely supported.

Caution  The location of the rack must allow air to flow unrestricted in and out of the node.

Warning  Before handling any cards, ground yourself to the card cage with a wrist strap.

Sequence for Installing the Switch

The information in the section applies to only an open rack installation. It identifies the installation sequence for the node in general. For the sequence of enclosure modules in particular, see “Stacking Order for Enclosure Modules.”

The installation sequence is:

1  Remove all cards (except the PXMs) and the power supplies according to the instructions in “Removing a Front Card,” “Removing a Back Card,” and “Removing an AC Power Supply.”

2  Install enclosure modules in the order listed in ‘Stacking Order for Enclosure Modules” and according to the instructions in “Installing the Enclosure.”

Stacking Order for Enclosure Modules

A specific stacking order is mandatory. The following stacking order list begins with optional brackets then continues with the bottom module through the module at the top of the enclosure. Each of these modules has its own section with detailed installation steps. See Figure 4-3 for the location of each module.

1  Optional spacers for 23-rack installation

2  Optional AC power assembly

3  Air intake chamber

4  Lower spacer unit or optional lower fan tray

5  Card cage

6  Upper (mandatory) cooling unit fan tray

7  Exhaust plenum
Figure 4-3  Component Locations in an AC-Powered MGX 8850 Switch

Exhaust plenum 3.5 in.
Upper fan tray 1.75 in.
Removing a Front Card

Each single-height front card has a latch to secure it when the card connects to the backplane. Each double-height card has a latch at the top and the bottom. (See Figure 4-4.)

Figure 4-4 Front Card Insertion/Extractor Latch

To remove a front card:

**Step 1** Press the tip of a small, flat-blade screwdriver into the slot of the insertion/extractor lever until the latch springs open by approximately 10 degrees. For double-height cards, repeat this action at the bottom latch.

**Step 2** To dislodge the card from the connector, lift the lever.

**Step 3** Gently pull the card out of the card cage.
Removing a Back Card

A screw at the top and bottom of the faceplate of each back card (or line module or port adapter) secures the card in its backplane connector. The extraction levers let you pull the card from the backplane connector after you loosen the screws.

To remove a back card:

Step 1 Use a flat-blade screwdriver to loosen the two retaining screws in the faceplate.
Step 2 Simultaneously pull out both extractor levers to pull the card from the backplane connector after you loosen the screws.
Step 3 Gently pull the card out of the card cage and store it in a safe location.

Removing an AC Power Supply

Removing AC power supplies makes the AC power tray installation much easier. For a mid-mount installation, however, you must remove the power supplies for reasons explained in the forthcoming section “Installing the Enclosure.” Before executing the following steps, make sure you have a record of the location of each power supply.

Step 1 Remove the air intake grille by inserting a flat-bladed screwdriver in the access hole at the top then rotating the screw until the spring latch opens. See “Release” in Figure 4-5.

Figure 4-5 Removing an AC Power Supply

Step 2 Tilt the air inlet grille down to about a 45-degree angle, then lift it out and set it aside. This action exposes the hinged door that serves as the power supply retainer bracket.
Step 3 With a flat-bladed screwdriver, unscrew the captive retainer screw in the center of the hinged door and tilt the door down.
Step 4 Loosen the captive screw at the front-bottom of the power supply you want to remove. (See Figure 4-6.)
Step 5 Grip the handle, then remove the supply.
Installing the Enclosure

Using the guidelines in “Introductory Information,” install each component according to the steps in this section. The section contains descriptions for the enclosure modules and includes descriptions for the power cables and cable manager.

Step 1  If this node requires the brackets for a 23-inch rack, attach them to the enclosure modules.

Step 2  For an AC-powered system, install the optional AC power tray. Its height is three rack-mount units (three RUs is 5.25 inches or 13.34 cm). See Figure 4-7.

For a mid-mount installation, insert each mounting screw from the inside the power tray so that the nut is on the outside of the tray. This approach is necessary to allow room for power supplies in either the first or last power supply trough.

Figure 4-7  Optional AC Power Tray
While you secure the front of the power supply tray with the front screws, hold the adjacent front flange of the tray slightly to the outside so the hinged door can freely open and close. See “Front Flange” in Figure 4-7. The space between the right-angle edge of the flange and the edge of the hinged door should be about the thickness of a thumbnail.

**Step 3** For a DC-powered system, install the DC-PEMs at the back of the air intake module. If you install only one DC-PEM, install it on the right. (See Figure 4-8 and Figure 4-9.)

**Step 4** For important information on removing a PEM in a redundant setup with the power on, refer to the section “Swapping a Primary or Redundant DC PEM With Power On.”

**Figure 4-8** DC-PEM

![DC-PEM Diagram](image)

**Figure 4-9** DC-PEMs Installed in Back of the Air Intake Module

**Step 5** Install the air intake module (3 RU). (See Figure 4-10.)
Installing the Enclosure

Figure 4-10  Air Intake Module

Step 6  Install the optional booster fan tray if present, otherwise install the spacer unit (1 RU). See Figure 4-11. If you install a fan tray, note the label that says “This Side Up.”

Step 7  Install the card cage (10 RUs). When you move the card cage into position, be sure the base of the card cage at the back fully clears the top-rear edge of the spacer unit or fan tray beneath it.

Step 8  Install the mandatory fan tray (1 RU). See Figure 4-11, and note the label that says “This Side Up.” When you move the fan tray into position, make sure its base at the back fully clears the top-rear edge of the card cage beneath it.

Figure 4-11  Fan Tray

Step 9  Install the exhaust plenum (2 RUs).

If you install the cable manager, proceed to the next section, titled “Installing the Cable Manager,” before you do the tasks in the section titled “Installing the Fan Power Cabling.”

Installing the Cable Manager

The cable management system consists of two identical cable managers, left and right-side mounting brackets, and screws. First, attach the mounting brackets according to the steps that follow.

Step 1  Holding the bracket with one hand, position it so the lower flange fits inside the card cage wall. Make sure the screw hole on the bracket aligns with the screw hole on the card cage.

Step 2  Drive in the screw.

Next, use the provided 10-32 sized screws to install the cable managers. As Figure 4-12 shows, the orientation of the cable managers must be such that the cable channels on the top cable manager are on top, and the cable channels on the bottom cable manager are on the bottom.

Note  Fiber optic cabling and copper cabling take different paths on the cable manager. Use the cable channels for the copper cabling, but run the fiber optic cables over the sheet metal portion.
Installing the Fan Power Cabling

The fans receive power off the backplane by way of a fan power cable. To reach the backplane connector, the fan power cable D-connector passes through an outer hole at the base of the card cage. At the fan-tray end of the cable, the D-connector plugs into J1—the only connector at the back of the fan power tray. Refer to Figure 4-13 for an illustration of the fan power cable and Figure 4-14 and Figure 4-15 for illustrations of the card cage area with the cabling holes for AC and DC-powered systems. Note that the holes for system power cabling alternate with the smaller holes for fan power. From left to right, the sequence of access holes is:

1. System power.
2. Fan power.
3. System power.
4. Fan power. Use the fan power access hole on the far right for the upper fan tray.
To install the fan power cabling:

**Step 1**  
With the narrow row of pins in the D-connector on the bottom, use two hands to slip the framed connector through the access hole at the base of the card cage. Move the connector straight towards the backplane so you can guide it through the second internal guide.

With the D-connector fully inserted in the backplane connector, the captive screws on the frame are clearly aligned with the threaded holes on the chassis.

**Step 2**  
Tighten the captive screws only enough to secure the connector. Do not apply much torque, and do not use a power screw driver.

**Step 3**  
Insert the D-connector in J1 on the fan tray and tighten the captive screws only enough to secure the connector. Do not use a power screw driver.

**Step 4**  
For the mandatory fan tray, position its power cable to run through the channel formed by the mounting bracket on the right.
Figure 4-14   Access for Fan Power at the Backplane, AC-Powered Node
Installing the System Power Cabling

A system power cable carries current from either a DC PEM or AC-DC power module to the backplane. The cable is the same for either type of power system. (See Figure 4-16.) The end with the metal frame around the D-connector plugs into the larger of the access holes to the backplane. From left to right, the first and third access holes are for system power. See Figure 4-17 for an AC-powered system and Figure 4-18 for a DC-powered system.
Installing the System Power Cabling

Figure 4-16  Cable Assembly for System Power

- To backplane
- Connector frame
- Plastic cover (only on DC systems) to DC PEM

Figure 4-17  Access for System Power at the Backplane, AC-Powered Node

- Upper fan tray
- Upper fan tray cable
- Lower fan tray
- Lower fan tray cable
- Air intake plenum
An AC-power assembly or a DC-power has D-connectors to receive the un-framed connector. Connecting a power cable at the backplane has no requirement to connect at a particular connector.

To install system power cabling:

**Step 1** With the narrow row of pins in the D-connector on the bottom, use two hands to slip the larger connector through the access hole at the base of the card cage.

**Step 2** Move the connector straight towards the backplane so you can guide it through the second, internal guide.

When you have fully seated the D-connector in the backplane connector, the captive screws on the frame are clearly aligned with the threaded holes on the chassis.

**Step 3** Tighten the captive screws only enough to secure the connector. Do not apply much torque. Do not use a power screw driver.

**Step 4** Insert the D-connector without the frame in J1 on the power assembly

**Step 5** Tighten captive screws only enough to secure the connector. Do not use a power tool.

If you need to swap a DC PEM in a redundant system with the power on, see “Swapping a Primary or Redundant DC PEM With Power On” for instructions.
Swapping a Primary or Redundant DC PEM With Power On

If necessary, you can swap out and replace either a primary or a redundant PEM with power on. To avoid possibly tripping the system circuit breaker in the process, use the sequence described in this section for disconnecting and reconnecting the system power cabling.

Caution  The cable connector must be disconnected at the backplane end during hot PEM insertion or removal.

If you disconnect the cable first at the PEM, the system power cable is still hot. These hot contacts may inadvertently touch a surface of the chassis or metal connected to the chassis. If this contact occurs, the –48 VDC is shorted to the chassis, and the circuit breaker on the still-active PEM opens.

To remove a PEM with system power on:

Step 1  Turn off the circuit breaker on only the PEM you intend to replace.
Step 2  Turn off the branch circuit at the DC source (the distribution box, for example)
Step 3  Disconnect the three DC source wires at the wiring block on the PEM.
Step 4  Locate the backplane end of the cable for the PEM you intend to replace.
Step 5  At the backplane end of the cable, loosen the captive screws on the cable bracket.
Step 6  Pull the cable bracket out approximately one inch to disconnect the cable.
Step 7  At the end of the cable connected to the PEM, loosen the jack screws and disconnect the power cable from the PEM.
Step 8  Remove the PEM.

To install a PEM in a system with power on:

Step 1  Make sure the circuit breaker is in the off position.
Step 2  Insert the PEM and tighten the captive mounting screws.
Step 3  Connect the system power cable first at the PEM.
Step 4  Connecting the backplane end of the system power cable to the backplane requires some dexterity, especially if the cabling around the system power cable is dense. Grasp the cable bracket at the captive screws and gently push the bracket straight in. Furthermore:
  • To align the pins of the backplane and cable pins, move the cable connector slightly up and down or side to side until the connectors are aligned and able to mate.
  • When executing this step, keep the bracket as level as possible.
  • The connector is fully inserted when the connector shell (housing) easily moves all the way in to the enclosure hole and the exterior of the shell with the captive screws is fully flush with the enclosure.
Step 5  Tighten the connector screws.
Step 6  Attach the three DC source wires at the wiring block on the PEM.
Step 7  Turn on the DC power at the circuit branch source.
Step 8  Turn on the circuit breaker of the PEM.
Installing AC Power Supplies

If you left the AC power supplies in the tray during installation, proceed to the next section, “Connecting AC Power to the Switch.” To re-install power supplies you have removed:

**Step 1** Push each power supply into the tray. When it almost reaches the end of the slot in the tray, a slight resistance is encountered. Push the power supply slightly farther in to achieve the final position and full connector mating.

**Step 2** Secure each supply to the tray by tightening the captive screw at the bottom-front of each supply. For slots without a power supply, the hinged door on the tray should have a removable, blank panel.

**Step 3** Close the hinged door and secure it with the screw at the top-center of the door.

Connecting AC Power to the Switch

If you removed the AC power supplies before installing the AC power tray, re-install them in the same locations they had when the switch arrived. If necessary, use the steps in the section titled “Installing AC Power Supplies.” At the switch, the AC power receptacle is an IEC-type with a clamp.

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**Note** The AC voltage range is 200–240 VAC.

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To install the power cord:

**Step 1** Loosen the cable clamp around the receptacle, otherwise the plug may not properly fit.

**Step 2** Firmly seat the plug. This may require you to hold the chassis with one hand while you push the plug in with the other hand.

**Step 3** Tighten the clamp.

Cisco can provide AC power cords with the following types of AC wall plugs:

- 20 A NEMA L620, 3-prong plug (domestic U.S.)
- 13 A 250 VAC BS1363, 3-prong fused plug (UK, Ireland)
- CEE 7/7 (Continental Europe)
- AS3112 (Australia and New Zealand)
- CEI23-16/VII (Italy).

Connecting DC Power to the Switch

This section describes how to connect the DC wiring to the switch. This switch uses 6 AWG (10 square mm) copper wire. For details on wire lengths, wire gauges, and grounding concerns, see Chapter 3, “Site Preparation.”

Each primary or redundant DC source connects to one or two DC PEMs in the switch. Make sure that each source comes from a dedicated branch circuit. Only a source that complies with safety extra low voltage (SELV) requirements in AS/NZ 3260 and EN60950 should connect to a DC-powered switch. The wiring for a DC-powered system is provided by the customer and must be three-wire solid or stranded copper. Its insulation should be rated for 60 degrees centigrade.

For installations where protection conduit is not required by local codes, the plastic cover visible at the bottom of Figure 4-19 is sufficient. Two phillips screws secure this cover to the PEM.
Use the visual information in Figure 4-19 and Figure 4-20 to connect the DC wiring.

**Step 1**  
Cut the appropriate wire lengths.

**Step 2**  
Strip the insulation back 0.25 inches (6 mm).

**Step 3**  
With power off at both the switch and the source, attach each wire to the #10-32 lugs. See Figure 4-20.

**Figure 4-19**  
DC-PEM

**Figure 4-20**  
Placement of DC Wiring Lugs on the DC-PEM
Installing the Cards

This section describes how to install front and back cards. Service modules can go in any slot except reserved slots 7, 8, 15, 16, 23, 24, 31, and 32. The PXMs and optional SRM core cards occupy these reserved slots. Additionally, upper slots 9 and 10 and lower slots 25 and 26 do not have a special bus for the bulk distribution feature. For this reason, Cisco recommends that if the switch contains one or more Route Processor Modules (RPM/Bs), the first 2 RPM/Bs go in slots 9 and 10.

**Warning** To prevent damage to the cards from static electricity, put on a wrist strap and connect it to any convenient metal contact on the switch before you touch any cards.

**Caution** Handle the PXM front card very carefully to preserve the alignment of the attached disk drive. Do not drop or bump the PXM.

**Warning** Inserting the cards in the correct slot is important for all cards but especially for the back cards because of the potential for electrical damage. If you insert a service module back card into a PXM back card slot (7, 8, 23, or 24), damage to the card and backplane may result.

If you accidentally insert a back card for a service module into slot 7, 8, 23, or 24 then observe incorrect switch operation, check for bent or damaged pins on the backplane and the back card.


g--- Installing a Front Card

Verify the accuracy of the intended slot for each card before you begin installing the cards.

To install a front card:

**Step 1** Position the rear card guides over the appropriate slot at the top and bottom of the cage.

**Step 2** Gently slide the card all the way into the slot.

**Step 3** Press the insertion-extractor lever until it snaps into the vertical position.

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**Note** The card should slide in and out with only slight friction on the adjacent board’s EMI gaskets. Do not use force, and investigate any binding.

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g--- Installing a Back Card

Verify the accuracy of the intended slot for each card before you begin installing the cards:

**Caution** Before using the switch, verify that the daughter card type on the PXM corresponds to the uplink card type. Serious damage may result if the power is on and these cards are mismatched.

To install a back card:

**Step 1** Make sure the two extractor levers are in the “in” position. As you move the card, the levers should be flush with the vertical edge of the back card.

**Step 2** Gently slide the card all the way into the slot.

**Step 3** Push the card into the connector.

**Step 4** Tighten the two captive screws on the card faceplate only enough to secure the card.
Redundancy for Service Modules

Service modules can have either 1:1 redundancy or 1:N redundancy. For information on installation requirements, refer to the section titled “Service Resource Module” in this chapter. For configuration steps, see the section for the SRM in Chapter 6, “Card and Service Configuration.” For instructions on how to use the CiscoView application to configure redundancy, refer to the CiscoView user-documentation.

For 1:1 redundancy, place the card sets in adjacent slots and connect the appropriate Y-cable to the paired ports on the active and standby cards. Applicable service modules are:

- MGX-FRSM-2CT3
- MGX-FRSM-2T3 and MGX-FRSM-2E3
- MGX-FRSM-HS2/B

For 1:N redundancy, an MGX Service Resource Module-3T3 (MGX-SRM-3T3/B) card set is necessary. It supports 1:N redundancy for the following:

- MGX-AUSM-8T1/B
- MGX-AUSM-8E1/B
- MGX-FRSM-8T1
- MGX-FRSM-8E1
- AX-CESM-8T1
- AX-CESM-8E1

With 1:N redundancy, a group of service modules has one standby module. Redundancy by way of the redundancy bus on the MGX-SRM-3T3/B requires the redundant card group to have one of the following special back cards for redundancy support:

- R-RJ48-8T1-LM
- R-RJ48-8E1-LM
Processor Switching Module

This section describes the unique requirements for installing the Processor Switching Module (PXM) card set and briefly describes the features of each associated back card. The PXM card set consists of the PXM front card, the PXM User Interface back card (PXM-UI), and various uplink back cards that can serve as either a trunk or a UNI. Each description includes a faceplate description and a list of applicable cables. For instructions on how to configure the PXM functionality for switch and network control, see Chapter 5, “Configuring the MGX 8850 Switch.” For lists of the physical details of PXM cards, standards compliances, and so on, see Appendix A, “System Specifications.”

**Note** The common instructions for installing any card in this switch appear in an earlier section, “Installing the Cards.”

![Caution](image1) **Caution** Handle the PXM front card very carefully to preserve the alignment of the attached disk drive. Do not drop or bump the PXM.

![Caution](image2) **Caution** Before using the switch, verify that the daughter card on the PXM corresponds to the uplink card type. Serious damage may result if the power is on and these cards are mismatched.

**Note** If you accidentally insert a back card for a service module into slot 7, 8, 23, or 24 then observe incorrect switch operation, check for bent or damaged pins on the backplane and the back card.

### PXM Front Card

Primarily, the PXM controls the switch and provides 1.2 Gbps of non-blocking, shared memory switching. In addition, the PXM features are:

- A disk drive that holds software, statistics, and firmware for all the cards (used for upgrades).
- Environmental monitoring (cabinet temperature, fan speed, and power supply voltages).
- Hot swappable, 1:1 redundancy.
- Automatic Protection Switching (APS). Note that APS is available for only the “B” models of the OC-3 and OC-12 uplink cards.

For descriptions of switch configuration tasks, see Chapter 5, “Configuring the MGX 8850 Switch.” For descriptions of how to modify partitioning, specify APS, and add UNI-port connections, see Chapter 6, “Card and Service Configuration.”
Figure 4-21 PXM Front Card
PXM User Interface Back Card

The PXM User Interface card (PXM-UI) connects the switch to the various ports that allow you to communicate with and control the switch. Install the PXM-UI in the upper half of the back of the PXM. See Figure 4-22 for the connectors on the PXM-UI. For specifications on this card, see Appendix A, “System Specifications.”

The back card also provides:

- One DB-15 female connector for T1 or E1 clock input
- One BNC connector for E1 clock input
- One DB-15 female connector for alarm interface

Figure 4-22   User Interface Card for PXM

Making External Clock Connections

If external equipment or a local digital central office is to provide synchronization to the MGX 8850 node, you can connect the external clock source to the PXM-UI back card. For a T1 clock input, connect the source to the RJ 45 connector labeled “T1 Clock.” For an E1 clock input, use the SMC connector marked “E1 Clock.” See Chapter 5, “Configuring the MGX 8850 Switch,” for this switch-level feature.
Alarm Output Connection

Dry contact relay closures are available for forwarding MGX 8850 alarms to an alarm system. Separate visual and audible alarm outputs are available for major and minor alarm outputs. The MGX 8850 alarm outputs are available on a DB15 connector on the PXM-UI back card faceplate. Refer to Appendix B, “Cabling Summary,” for the pinouts on this connector. Use switchboard cable for running these connections.

SMFLR-1-622 Back Card

An illustration of the long-reach OC-12 card appears in Figure 4-23. For specifications on this card, refer to Appendix A, “System Specifications.” Note that Automatic Protection Switching (APS) requires the “B” model—an SMFLR-1-622/B.

Figure 4-23 OC-12 Long Reach Back Card
SMFIR-1-622 Back Card

The intermediate reach OC-12 back card appears in Figure 4-24. For specifications on this card, refer to Appendix A, “System Specifications.” Note that Automatic Protection Switching (APS) requires the “B” model—an SMFIR-1-622/B.

Figure 4-24  Intermediate Reach OC-12 Back Card
SMF-155 Back Card

The SMF-155 back card provides a physical single-mode fiber optic SONET OC-3 interface that conforms to ANSI T1.105 and GR-253-CORE standards. This interface uses SC connectors, and redundant configurations are supported through Y-cables. See Figure 4-25 for an illustration of the OC-3 back card. For specifications on this card, refer to Appendix A, “System Specifications.” Note that Automatic Protection Switching (APS) requires the “B” model—an SMF-155/B.

Figure 4-25  Four-Port OC-3 Back Card
BNC-2T3 Back Card

An illustration of the two-port T3 back card appears in Figure 4-26. For card specifications, refer to Appendix A, “System Specifications.”

![BNC-2T3 Back Card Diagram]

BNC-2E3 Back Card

Two versions of the BNC-2E3 card are available. The BNC-2E3A applies to Australia only, and the BNC-2E3 applies to all other sites that require E3 lines on the PXM uplink card. An illustration of the two-port E3 back card appears in Figure 4-27. For specifications on this card, refer to Appendix A, “System Specifications.”
Figure 4-27  BNC-2E3

BNC-2E3 Back Card

PORT 1

SIGNAL

PORT 2

SIGNAL
ATM UNI Service Module

The MGX-AUSM-8T1/B and MGX-AUSM-8E1/B (or simply “AUSM/B” as a generic reference to both card sets) are multipurpose front cards that use an eight-port T1 or E1 back card. The AUSM/B supports the following applications:

1. ATM Inverse Multiplexing N x T1 and N x E1 trunking
   This application supports inverse multiplexed trunks between BPX 8600-series network nodes through MGX 8850 switches and remote MGX 8850 switches.

2. ATM UNI card with eight ports to provide a high port density service module
   With all 24 available slots installed with the AUSM/B cards, a single MGX 8850 switch can support up to 192 individual T1 or E1 lines.
   In UNI/NNI mode each card can support 1000 data connections and 16 management connections.

3. UNI/NNI access to CPE and other networks
   This application allows access over an UNI to IMA-based CPE and over an NNI to another ATM network.

4. NNI/NNI access to CPEs
   This application supports ATM ports over single T1 or E1 line and IMA ports over multiple lines (connected to IMA-based CPE).

The following back cards are compatible with the AUSM/B:
- RJ48-8T1 back card for T1
- RJ48-8E1 back card for E1
- SMB-8E1 back card for E1

The AUSM/B has the following features:
- Statistics collection.
- Support for VP connections.
- Support for BERT functionality with loopback pattern generation/verification on individual lines.
- Auto-card restore.
- 1:N redundancy for all back card types through the optional Service Resource Module (SRM).

AUSM Front Card

The AUSM/B front card oversees all major functions of the ATM interface. It contains firmware for both the T1 and the E1 line interfaces and downloads from the PXM the appropriate code when it recognizes the back card type. An illustration of an eight-port AUSM/B front card appears in Figure 4-28. For specifications on this card, refer to Appendix A, “System Specifications.”
Descriptions of the LED indicators on the faceplate of the AUSM/B appear in Table 4-1.
Table 4-1  Eight-Port AUSM/B LED Indicators

<table>
<thead>
<tr>
<th>Type of LED</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PORT LED</td>
<td>Green</td>
<td>Green indicates the port is active.</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>Red indicates a local alarm on the port.</td>
</tr>
<tr>
<td></td>
<td>Yellow</td>
<td>Yellow indicates a remote alarm on the port.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Off indicates the port has not been activated (upped).</td>
</tr>
<tr>
<td>ACTIVE LED</td>
<td>Green</td>
<td>On indicates the card set is in active mode.</td>
</tr>
<tr>
<td>STANDBY LED</td>
<td>Yellow</td>
<td>Slow blink with Active LED off means the card is in the boot state.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fast blink with Standby LED on means card is receiving firmware.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fast blink indicates the service module is passing BRAM channel information to the PXM.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steady yellow indicates the card is in Standby mode and the firmware is executing ADMIN code.</td>
</tr>
<tr>
<td>FAIL LED</td>
<td>Red</td>
<td>Steady Red with Active and Standby LEDs off indicates either the card is in the Reset condition, the card has failed, or the card set is not complete (no line module).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steady Red with Active LED on indicates the card was active prior to failing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steady Red with Standby LED on indicates the card was standby prior to failing.</td>
</tr>
</tbody>
</table>

Back Cards for the AUSM/B

The MGX-AUSM-8T1/B and MGX-AUSM-8E1/B use the generic eight-port T1 or E1 line modules that operate with the eight-port service modules. The standard T1 version of the back card has eight RJ-48 connectors. The standard versions of the E1 back card have either eight RJ-48 connectors or eight pairs of SMB connectors. To support 1:N redundancy through an MGX-SRM-3T3/B card set, special versions of the RJ-45 back card must exist in the system.

Redundancy Support for the AUSM

Redundancy support for the AUSM requires an MGX-SRM-3T3/B card set and the special versions of the RJ-45 back cards that support redundancy. See Figure 4-29 and Figure 4-30 for illustrations of the back cards. Differences exist in certain aspects of redundancy support for the MGX-AUSM-8T1/B and MGX-AUSM-8E1/B. For details on the requirements for redundancy through an MGX-SRM-3T3/B, refer to the section in this chapter titled “Service Resource Module.”
Figure 4-29  Standard RJ-48 Back Card for the MGX-AUSM-8T1/B

T1 RJ48
Back Card

RJ48-8T1

1 2 3 4 5 6 7 8
Figure 4-30  Standard RJ-48 and SMB Back Cards for the MGX-AUSM-8E1/B
Frame Service Modules

This section describes installation requirements that are particular to the various types of Frame Service Modules (FRSMs). For hardware and other specifications on the FRSMs, refer to Appendix A, “System Specifications.” For descriptions of how to configure the card, lines, and ports and add Frame Relay connections, refer to Chapter 6, “Card and Service Configuration.” The supported FRSM front cards and related back cards are:

- MGX-FRSM-2CT3 front card with the BNC-2T3 back card
- MGX-FRSM-2T3 or MGX-FRSM-2E3 front card with a BNC-2T3 or BNC-2E3 back card
- MGX-FRSM-HS2/B with a SCSI2-2HSSI back card
- MGX-FRSM-HS1/B with an MGX-12IN1-S4 back card
- AX-FRSM-8T1 or AX-FRSM-8E1 with one of the following back cards:
  - RJ48-8T1-LM
  - R-RJ48-8T1-LM (for redundancy support only)
  - RJ48-8E1-LM
  - SMB-8E1-LM
  - R-SMB-8E1-LM (for redundancy support only)

An FRSM can reside in any slot except 7, 8, 15, 16, 31, and 32. In addition, any card for which you specify 1:N redundancy through the redundancy bus and the MGX-SRM-3T3/B cannot go in slot 9, 10, 25, or 26. Whenever possible, the VHS cards should go in the upper bay of the card cage because the upper half of the backplane provides higher bandwidth at each slot.

Very High Speed Frame Service Modules

FRSM-VHS supports Frame Relay services on a T3, E3, or HSSI interface. (The collective name for the MGX-FRSM-2CT3, MGX-FRSM-2T3, MGX-FRSM-2E3, and MGX-FRSM-HS2/B is Very High Speed Frame Service Modules—FRSM-VHS for short). The distinction between the front cards is the firmware operation. The FRSM-VHS group consists of:

- MGX-FRSM-2CT3, which provides channelized Frame Relay service over two T3 lines on a BNC-2T3 back card.
- MGX-FRSM-2T3, which provides unchannelized (clear-channel) Frame Relay service over two T3 lines at 44.736 Mbps each. It can also support subrate T3 for tiered DS3 on each physical port. The back card is a BNC-2T3.
- MGX-FRSM-2E3, which provides unchannelized (clear-channel) Frame Relay service over two E3 lines at 34.368 Mbps each. It can also support subrate E3 for tiered DS3 on each physical port. The back card is a BNC-2E3A in Australia or a BNC-2E3 everywhere else that requires E3.
- MGX-FRSM-HS2/B, which provides unchannelized Frame Relay service over two HSSI lines on the SCSI2-2HSSI back card. Each port can operate in either DTE or DCE mode.

Example illustrations of the FRSM-VHS front and back cards appear in the figures that follow.

- For the MGX-FRSM-2CT3 front card, see Figure 4-31.
- For the MGX-FRSM-2T3 or MGX-FRSM-2E3 front card, see Figure 4-32.
- For the MGX-FRSM-HS2/B front card, see Figure 4-33.
- For the BNC-2T3 back card, see Figure 4-34.
For the BNC-2E3 back card, see Figure 4-35.
For the SCSI2-2HSSI back card, see Figure 4-36.
Figure 4-32  MGX-FRSM-2T3 or MGX-FRSM-2E3

CLEI Code Label

FRSM 2T3E3

PORT 1
PORT 2

ACT
STBY
FAIL
Figure 4-33 MGX-FRSM-HS2/B

CLEI Code Label

Front Card
Figure 4-35  BNC-2E3
The MGX-FRSM-HS1/B supports four V.35 ports. Each port can operate in DTE or DCE mode. The mode depends on the type of attached cable. The information in this section lets you determine the correct cabling for the intended mode of each port. For a description of card, line, and port configuration, see Chapter 6, “Card and Service Configuration.”. An illustration of the MGX-FRSM-HS1/B front card appears in Figure 4-37. The multifunction 12IN1-S4 back card appears in Figure 4-38. Cabling descriptions follow Figure 4-37.

**Note** The MGX-FRSM-HS1/B does not support redundancy, so redundancy is not a consideration for deciding on a slot for the card. Nevertheless, they should be in the lower bay due to Cellbus speed.
The cable models come from the Cisco 12IN1 series of cables. Each cable can have a male or female connector at the far end. Also, the available clock sources depend on the mode. In DTE mode, the clock source is either line or ST (ST is a wire in the cable). For DCE, the clock source is the front card. See Table 4-2 for the relationship between cabling and modes and Table 4-3 for part numbers.

**Table 4-2 Cabling and Clock Sources for the MGX-FRSM-HS1/B**

<table>
<thead>
<tr>
<th>Mode</th>
<th>Type of Cable</th>
<th>Clock Source</th>
<th>Mode of Far End</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTE</td>
<td>DTE</td>
<td>line</td>
<td>DCE (male or female connector at far end)</td>
</tr>
<tr>
<td>DCE</td>
<td>DCE</td>
<td>internal</td>
<td>DTE (male or female connector at far end)</td>
</tr>
<tr>
<td>DTE_ST</td>
<td>DTE</td>
<td>ST line</td>
<td>DCE (male or female connector at far end)</td>
</tr>
</tbody>
</table>
### Table 4-3  Cabling Types and Part Numbers

<table>
<thead>
<tr>
<th>Type of Cable</th>
<th>Far End Connector</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTE</td>
<td>male (standard)</td>
<td>72-1428-01</td>
</tr>
<tr>
<td>DTE</td>
<td>female (atypical)</td>
<td>72-1436-01</td>
</tr>
<tr>
<td>DCE</td>
<td>female (standard)</td>
<td>72-1429-01</td>
</tr>
<tr>
<td>DCE</td>
<td>male (atypical)</td>
<td>72-1437-01</td>
</tr>
<tr>
<td>V.35 DTE-DCE</td>
<td></td>
<td>72-1441-01</td>
</tr>
<tr>
<td>Straight-through</td>
<td></td>
<td>72-1478-01</td>
</tr>
<tr>
<td>Loopback plug</td>
<td></td>
<td>72-1479-01</td>
</tr>
</tbody>
</table>

**Figure 4-38  12IN1 S4 Back Card Faceplate**
Eight-Port FRSM With T1 or E1

The eight-port FRSMs support channelized or unchannelized service on either T1 or E1 lines. Figure 4-39 (applies to both MGX-FRSM-8T1 and MGX-FRSM-8E1), and Figure 4-40 and Figure 4-41 (primary and redundant back cards for T1 and E1).

**Figure 4-39** MGX-FRSM-8T1
Figure 4-40  Standard RJ-48 Back Card for the MGX-FRSM-8T1
Figure 4-41 Standard RJ-48 and SMB Back Cards for the MGX-FRSM-8E1
Redundancy for Frame Service Modules

FRSMs can have either 1:1 redundancy or 1:N redundancy. For 1:1 redundancy, a Y-cable is necessary. The very high speed MGX-FRSM-2CT3, MGX-FRSM-2T3, MGX-FRSM-2E3, and MGX-FRSM-HS2/B use Y-cable redundancy. For 1:N redundancy, an MGX-SRM-3T3/B (but no Y-cabling) are required. Differences may exist in the way the MGX-SRM-3T3/B supports redundancy for a particular T1 or E1 configuration. Refer to the section titled “Service Resource Module” in this chapter and the Service Resource Module description in Chapter 6, “Card and Service Configuration.”

1:1 Redundancy

For 1:1 redundancy, place the card sets in adjacent slots and connect a Y-cable for each pair of active and standby ports. On the CLI, configure the card for redundancy by executing the addred command. For instructions on how to use the CiscoView application to configure redundancy, refer to the CiscoView user-documentation.

1:N Redundancy

1:N redundancy for the eight-port FRSMs requires an MGX-SRM-3T3/B. With 1:N redundancy, a group of service modules includes one standby module. For installation requirements, see the “Service Resource Module” section in this chapter. For configuration requirements, see the section on the MGX-SRM-3T3/B in Chapter 6, “Card and Service Configuration.”
Circuit Emulation Service Module

The main function of the Circuit Emulation Service Module (CESM) is to provide a constant bit rate (CBR) circuit emulation service by converting data streams into CBR AAL1 cells for transport across an ATM network. The CESM supports the CES-IS specifications of the ATM Forum.

The eight-port models AX-CESM-8T1 and AX-CESM-8E1 let you configure an individual physical ports for structured or unstructured data transfer. A card set has a AX-CESM-8T1 or AX-CESM-8E1 front card and one of the following back cards:

- RJ48-8T1-LM
- R-RJ48-8T1-LM (for redundancy support only)
- RJ48-8E1-LM
- SMB-8E1-LM
- R-SMB-8E1-LM (for redundancy support only)

Redundancy for the Eight-Port CESM

Redundancy for the AX-CESM-8T1 and AX-CESM-8E1 is available through the MGX-SRM-3T3/B. The support is 1:N and so requires that the group contain one redundancy back card. The redundancy back card must be the special R-RJ45 version. For information on installation requirements, refer to the “Service Resource Module” section. For configuration requirements, see the section on the SRM in Chapter 6, “Card and Service Configuration.” For instructions on how to use the CiscoView application to configure redundancy, refer to the CiscoView user-documentation.
Enclosure and Card Installation

Redundancy for the Eight-Port CESM

Figure 4-42 Front Cards for the Eight-Port CESM

T1 Front card

E1 Front card
LED Indicators for the Eight-Port CESM

The description of the LEDs on the eight-port CESM front card appear in Table 4-4.

<table>
<thead>
<tr>
<th>Type of LED</th>
<th>Color</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>PORT LED</td>
<td>Green</td>
<td>Green indicates the port is active.</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>Red indicates a local alarm on the port.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Off indicates the port has not been activated (upped).</td>
</tr>
<tr>
<td>ACTIVE LED</td>
<td>Green</td>
<td>On indicates the card set is in active mode.</td>
</tr>
<tr>
<td>STANDBY LED</td>
<td>Yellow</td>
<td>Slow blink without the Active LED indicates the card is in the boot state.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fast blink with the Standby LED indicates the card is being downloaded.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fast blink indicates the service module is passing BRAM channel information to the PXMI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steady yellow indicates the card is in Standby mode and the firmware is executing ADMIN code.</td>
</tr>
<tr>
<td>FAIL LED</td>
<td>Red</td>
<td>Steady Red with Active and Standby LEDs off indicates either the card is in the Reset condition, the card has failed, or the card set is not complete (no line module).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steady Red with Active LED on indicates the card was active prior to failing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steady Red with Standby LED on indicates the card was standby prior to failing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Both standby and red LED lit indicates self test failure.</td>
</tr>
</tbody>
</table>
Figure 4-43 Standard RJ48-8T1 Back Card
Figure 4-44 Standard RJ48-8E1 and SMB-8E1 Back Cards
Service Resource Module

This section describes the possible impact of installing a Service Resource Module-3T3 (MGX-SRM-3T3/B) on the service modules it supports. The MGX-SRM-3T3/B (or “SRM” for short) can provide 1:N redundancy for the T1 and E1 cards as well as bulk distribution for T1 cards. It has no communication with higher speed service modules, such as the MGX-FRSM-2CT3 and MGX-FRSM-HS2/B. See Figure 4-45 for an illustration of the MGX-SRM-3T3/B front card and the MGX-BNC-3T3-M back card.

The multifunction SRM has the following capabilities:

- A de-multiplexing function called bulk distribution carries traffic across the distribution bus between the T3 lines on the MGX-SRM-3T3/B and the T1 service modules. Bulk distribution can greatly reduce the number of T1 lines coming into the enclosure.
- 1:N redundancy support for service modules with RJ-48 connectors.
- Bit error rate testing (BERT) for T1 and subrate service module lines.

General Installation Requirements for the MGX-SRM-3T3/B

The following are card-level characteristics that apply to any SRM installation:

- The MGX-SRM-3T3/B and supported service modules must be in the same (top or bottom) bay.
- A non-redundant setup requires an MGX-SRM-3T3/B in slot 15 for the upper bay or slot 31 for redundancy in the lower bay. The PXM1 in slot 7 controls the SRMs in slots 15 and 31.
- An optional, redundant PXM1 in slot 8 controls the redundant SRMs in slots 16 and 32.
- If the switch has one or two primary SRMs for the primary PXM1 and the switch also has a redundant PXM1, it must have a redundant SRMs. Therefore, the switch can use one, two, or four MGX-SRM-3T3/Bs.
- The distribution bus does not support slots 9, 10, 25, and 26, so any service module that uses bulk distribution or relies on the distribution bus for redundancy cannot reside in these slots.

Bulk Distribution and Redundancy Support

The use of bulk distribution affects the requirements for SRM and service module back cards:

- With bulk distribution and 1:N redundancy support by way of the distribution bus, the service modules do not use back cards.
- For just 1:N redundancy by way of the redundancy bus, the supported service modules must have back cards—including one special redundancy back card. E1 redundancy requires the R-RJ48-8E1 line module, and T1 redundancy requires the R-RJ48-8T1 line module.

For bulk distribution, the T3 lines connect to an external multiplexer. The T1 lines on the other side of the multiplexer connect to the CPE. The SRM converts the received traffic from its T3 lines to T1 channels and sends the data to linked service modules. For instructions on linking T1 channels and card slots to the MGX-SRM-3T3/B, see Chapter 6, “Card and Service Configuration.”

For bulk distribution of T1 lines, note the following about the MGX-SRM-3T3/B:

- Each T3 line can support up to 28 T1 channels.
- The maximum number of T1 channels an MGX-SRM-3T3/B can support at one time is 80.
Note Upon replacing the failed card, you must switch back to normal operation because the node does not automatically do so.

Figure 4-45 MGX-SRM-3T3/B Card Set

![Diagram of MGX-SRM-3T3/B Card Set]

- Front card
  - ACT
  - STBY
  - FAIL
  - 1:N RES
  - SRM 3T3
  - CLEI Code Label
- Back card
  - BNM 3T3 M
  - PORT1
  - PORT2
  - PORT3
  - PORT5
Routing Data Cables

Copper-based data cables from the back cards run up or down to the cable manager and pass through the channels then run to either the left or right side of the rack. Fiber optic cables pass over the sheet metal portion. The cables subsequently go to the related equipment (CPE, for example). The view in Figure 4-46 shows only the cable manager on top.

![Routing Data Cables at the Cooling Assembly](image)

Initial Start-up of the MGX 8850 Switch

Before applying power to the MGX 8850 switch, check the following items:

1. Switch has proper grounding.
2. AC or DC power sources are correctly installed.
3. All cards are locked in the correct slots.
4. All cables are secure.
5. Control terminal is connected.

After the preceding checks, turn on the power. Check the following:

1. At the front of the unit, the status light on the PXM1 should be green.
2. For an AC-powered system, the “AC” and “DC” LEDs on each power supply should be green.
3. For a DC-powered system, the “DC OK” LED should be on.
4. After each service module comes up, the status LED should show that the card is in standby.
5. When power is turned on, make a visual check to verify that all fans are running.
6. After the system comes up, execute the `dsppwr` command.

Note: Neither the AC power supplies nor any other components have test points for checking power supply voltages. For a visual check, observe whether the AC OK LED and DC OK LED are lit.

Note: If you remove and reseat a back card or change it for another card, reset the related front card.
Converting Single-Height Slots to Double-Height Slots

The wiring on the Cisco MGX 8850 backplane requires you to consider the conversion sequence and other details when you convert single-height slots to double-height slots. One slot conversion means that you convert four single-height slots to two double-height slots. Be aware of the following before you convert the slots:

- Slot conversions begin on the left (as you face the front of the switch) and progress to the right. The starting point can be either slots 1–2 or slots 9–10. The exceptions are reserved slots 15–16 for the SRMs. You can convert SRM slots out of sequence.
- Slot conversions take place in the following pairs: 1–2, 3–4, 5–6, 9–10, 11–12, and 13–14.
- For conversions that involve either the left wall of the card cage or a bulkhead to the left of the slot, you must unscrew a track from the wall.
- After conversion, the new double-height slots take the number of the upper slot. For example, after you convert slots 1 and 2, slot numbers 17 and 18 become meaningless.
- Slots 7, 8, 15, 16, 31, and 32 are the reserved slots. The PXM1 cards (in a redundant configuration) reserve 7 and 8. If your system has one or more SRMs, the primary pair must reside in slots 15 and 31. The redundant pair resides in 16 and 32.

With a factory-installed Cisco MGX 8850 node, the single and double-height cards reside in the preassigned locations. Refer to Figure 4-47 for an illustration of an enclosure that shows installed cards and center guide modules. Certain slots have a small, L-shaped bracket holding in the card. All instances of this bracket are the card slots immediately to the right of an enclosure wall (or bulkhead). The system has three such brackets.

Figure 4-47 Front View of an AC-Powered Cisco MGX 8850 Switch

Each center guide module is secured by either a vertical support bracket or a simpler support bracket. Most center guide modules rely on the vertical support bracket. Three locations use the small support bracket: at the left wall of the card cage and at the bulkhead to the right of slot 8 or slot 14. For an illustration of a center guide module with support bracket, see Figure 4-49. For an illustration of a center guide module with vertical support bracket, see Figure 4-48.
Warning  Use extreme caution when executing these steps with system power turned on.

To convert four single-height slots to two double-height slots in an operational system:

Step 1  Remove the cabling from the back card unless the back card applies to the double-height configuration after the conversion.

Step 2  Remove the back card.

Step 3  Remove the front card.

Step 4  Repeat steps 2 and 3 for every other single-height module you remove.

Step 5  Rotate the screw that holds in the vertical center guide module.

Where either the left wall of the card cage or a bulkhead exists on the left of the single-height card slots, a simple, L-shaped bracket holds in the center guide module.

Step 6  If the center guide module has either type of wall to the left, unscrew the track attached to the wall. If necessary, remove cards to unscrew it.

Step 7  Remove the vertical support bracket by moving it up and down until you can take it out. A hole becomes visible in the center guide module for inserting a screw driver.

Step 8  Insert a screw driver and loosen the long screw that holds in the center guide module.

Step 9  Remove the center guide module.

Step 10  Install the double-height front card and back cards as needed.

A simpler situation exists when you install a new MGX 8850 switch in a non-Cisco rack or an existing Cisco cabinet: just unscrew the center guide module and remove it. If the enclosure has the optional front door, blank faceplates are not necessary. With no door, you must install a blank faceplate if you create two double height slots but install only one card.
Figure 4-48  Center Guide Module With Support Bracket
Figure 4-49  Center Guide Module With Vertical Support Bracket