

# HARDWARE INSTALLATION GUIDE

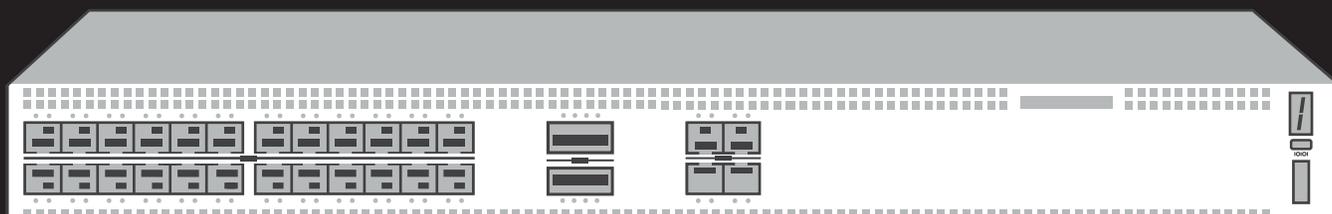
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EMS10G-28

# 28-PORT 10G IP NETWORK SWITCH

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24/7 TECHNICAL SUPPORT AT 1.877.877.2269 OR VISIT [BLACKBOX.COM](http://BLACKBOX.COM)



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## **SAFETY INSTRUCTIONS**

This guide provides site preparation recommendations, step-by-step procedures for rack mounting and desk mounting, inserting optional modules, and connecting to a power source.

**CAUTION:** To avoid electrostatic discharge (ESD) damage, wear grounding wrist straps when handling this equipment.

**WARNING:** Only trained and qualified personnel can install this equipment. Read this guide before you install and power up this equipment. This equipment contains two power cords. Disconnect both power cords before servicing.

**WARNING:** This equipment contains optical transceivers, which comply with the limits of Class 1 laser radiation.



**CLASS 1  
LASER PRODUCT**

**WARNING:** When no cable is connected, visible and invisible laser radiation may be emitted from the aperture of the optical transceiver ports. Avoid exposure to laser radiation. Do not stare into open apertures.

**CHAPTER 1: SPECIFICATIONS**

<b>28-PORT 10G NETWORK SWITCH (EMS10G-28) SPECIFICATIONS</b>	
<b>APPROVALS</b>	Environmental Compliances: Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A; RoHS EMI Certifications: Australia/New Zealand: AS/NZS CISPR 32: Class A; Canada: ICES-003, Issue-4, Class A; Europe: EN 55032: 2015+A1:2007 (CISPR 32); Class A; Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A Safety Certifications: UL/CSA, EN 60959-1, EN 60825-1, FDA Regulation 21 CFR 1040.10 and 1040.11
<b>ENVIRONMENTAL</b>	Operating Humidity: 10 to 85%, relative humidity, non-condensing Operating Temperature: 32 to 104° F (0 to 40° C) Storage Humidity: 5 to 95%, relative humidity, non-condensing Storage Temperature: -40 to +158° F (-40 to +70° C)
<b>MANAGEMENT</b>	Console port management: (1) RJ-45 serial Security/Authentication: RADIUS, RADIUS and IPv6, SSHv2, Security Architecture for IPSec, IPSec Authentication Header, ESP Protocol Network Management: SNMPv1/2, SSHv2, FTP, TFTP, SCP, Syslog, Port Mirroring, RADIUS, 802.1X, Support Assist (Phone Home, Netconf APIs, XML Schema, CLI Commit (Scratchpad), sFlow Automation: Control Plane Services APIs, Linux Utilities and Scripting Tools Quality of Service (QoS): Access Control Lists, Prefix List, Route-Map, Rate Shaping (Egress), Rate Policing (Ingress); Scheduling Algorithms: Round Robin, Weighted Round Robin, Deficit Round Robin, Strict Priority, Weighted Random Early Detect
<b>PERFORMANCE</b>	Switching Capacity: 960 Gbps; Forwarding Capacity: 720 Mpps; Frame Size: 9416 bytes; Packet Buffer Memory: 12 MB; CPU Memory: 4 GB; MAC Addresses: 160 K; ARP Table: 128 K; IPv4 routes: 128K; IPv6 hosts: 64K; IPv6 routes: 64K; Multicast hosts: 8K Link aggregation: 16 links per group, 128 groups; Layer 2 VLANs: 4K; MSTP: 64 instances; LAG load balancing: Based on layer 2, IPv4 or IPv6 headers
<b>PHYSICAL</b>	Connectors/Interfaces: (28) 10GbE SFP+, (2) 100GbE QSFP28, (2) AC PSUs, (4) Fan modules, PSU to I/O Panel Airflow Dimensions: 1.75" H (1 RU) x 17" W x 18" D (4.4 x 43.1 x 45.7 cm) Mounting: Rackmounted Weight: 19.66 lb. (8.92 kg)
<b>POWER</b>	Input: 100–240 VAC, 50/60 Hz Maximum Power: 290 W Typical Operating Power: 260 W Max. Thermal Output: 886 BTU/hr. Power Supply Type: (2) hot-swappable redundant AC power Fans: (4) hot-swappable redundant fans
<b>STANDARDS</b>	IEEE Compliance: 802.1ab LLDP; TIA-1057 LLDP-MED; 802.1s MSTP; 802.1w RSTP; 802.3ab Gigabit Ethernet (1000BASE-T); 802.3ad Link Aggregation with LACP; 802.3ae 10 Gigabit Ethernet (10GBASE-X); 802.3i Ethernet (10BASE-T); 802.3u Fast Ethernet (100BASE-TX); 802.3z Gigabit Ethernet (1000BASE-X); 802.1D Bridging, STP; 802.1p L1 Prioritization; 802.1Q VLAN Tagging, Double VLAN Tagging, GVRP; 802.1Qbb PFC; 802.2Qaz ETS; 802.1s MSTP; 802.1w RSTP; PVST+; 802.1X Network Access Control; 802.3ac Frame Extensions for VLAN Tagging; 802.3u Fast Ethernet (100BASE-TX) on mgmt ports; 802.3x Flow Control; 802.3z Gigabit Ethernet (1000BASE-X) with QSA; ANSI/TIA-1057, Jumbo MTU support 9416 bytes

## CHAPTER 2: OVERVIEW

### 2.1 INTRODUCTION

The EMS10G-28 is a low-cost top-of-rack (ToR) switch for 1 Gbps links to servers and 10 Gbps uplinks to the 40 Gbps switching fabric in the core.

The EMS10G-28 is a one rack unit (RU), full-featured fixed form-factor top-of-rack (ToR) 10/25/40/50/100GbE switch for 10G servers with small form-factor pluggable plus (SFP+), quad small form-factor pluggable plus (QSFP+), and quad small form-factor pluggable (QSFP28) ports.

NOTE: For specific port profile details, see the OS10 Enterprise Edition User Guide.

The switch supports the following configurations:

- ◆ (28) 10 G + (2) 100 G
- ◆ (28) 10 G + (2) 40 G
- ◆ (28) 10 G + (4) 50 G
- ◆ (28) 10 G + (8) 25 G
- ◆ (36) 10G

The EMS10G-28 side details are as follows:

- ◆ (28) fixed 10 G SFP+ ports
- ◆ (2) fixed 100 G QSFP28 ports
- ◆ (1) 7-segment stacking indicator
- ◆ (1) Micro USB console port

### 2.2 FEATURES

- ◆ (28) fixed 10GbE SFP+ ports, 2 fixed 100GbE QSFP28 ports
- ◆ (1) Micro USB-B serial console management port
- ◆ (1) One RJ-45 serial console management port
- ◆ (1) RS-232 serial console port
- ◆ (1) universal serial bus (USB) Type-A port for more file storage
- ◆ (1) 2-core Rangeley C2338 central processing unit (CPU), with 4GB DDR3 SDRAM and one 16 GB mSATA/M.2 SSD module
- ◆ (1) 7-segment stacking indicator
- ◆ Temperature monitoring
- ◆ Real time clock (RTC) support

### 2.3 WHAT'S INCLUDED

Your package should include the following items. If anything is missing or damaged, contact Black Box Technical Support at 877-877-2269 or [info@blackbox.com](mailto:info@blackbox.com)

- ◆ (1) EMS10G-28 Switch
- ◆ (1) RJ-45 to DB9 female cable
- ◆ (2) sets of rail kits, no tools required
- ◆ (2) PSUs

## CHAPTER 2: OVERVIEW

- ◆ (4) fan units
- ◆ (2) AC country/region-specific power cords

### 2.4 ADDITIONAL ITEMS YOU MAY NEED

- ◆ Torx screwdriver
- ◆ Copper or fiber cables
- ◆ Ground cable and lug for the frame end of the ground cable
- ◆ Extra fan module
- ◆ Extra mounting brackets if installing in a four-post rack or cabinet

### 2.5 HARDWARE DESCRIPTION

#### 2.5.1 FRONT PANEL

Figure 2-1 shows the front panel of the switch. Table 2-1 describes its components.

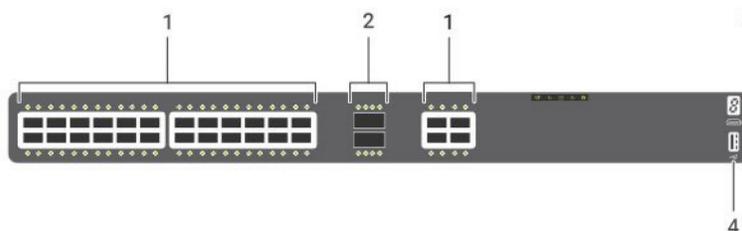


FIGURE 2-1. FRONT PANEL OF THE SWITCH

TABLE 2-1. FRONT PANEL COMPONENTS

NUMBER IN FIGURE 2-1	COMPONENT	DESCRIPTION
1	(28) SFP+ optical ports	SFP+ modules install here , Links to fiberoptic devices
2	(2) QSFP28 optical ports	SFP+ modules install here, Links to fiberoptic network
3	(1) Micro USB console port	Links to serial console
4	(1) USB Type A port	Used for storage

TABLE 2-2. COMPATIBLE SFPS

PRODUCT CODE	DESCRIPTION
LSP421	SFP+ - 10-Gb, Extended Diagnostics, 850-nm Multimode Fiber, 300-m, LC
LSP422	SFP+, 10GBASE-R, 1310-nm single-mode, 10 km
LSP431	SFP+, 10-Gb, Extended Operating Temperature & Diagnostics, 850-nm Multimode Fiber, 300-m

# CHAPTER 2: OVERVIEW

## 2.5.2 BACK PANEL

Figure 2-2 shows the back panel of the switch. Table 2-3 describes its components.

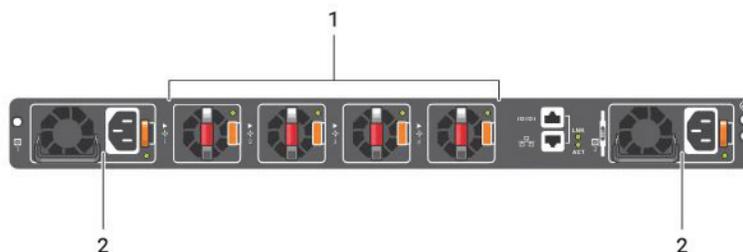


FIGURE 2-2. BACK PANEL OF THE SWITCH

TABLE 2-3. BACK PANEL COMPONENTS

NUMBER IN FIGURE 2-2	COMPONENT	DESCRIPTION
1	(4) fan modules	Provide proper ventilation
2	(2) power supply units with integrated fans	Provide redundant power

## 2.5.3 LED INDICATORS

The EMS10G-28 includes LED displays on the I/O side of the switch. This section describes open networking installation environment (ONIE) LED behaviors. Some LED behaviors may change after you install your software.

The following EMS10G-28 switch LED behavior is seen during ONIE operations.

Figure 2-3 shows the LEDs on the switch. Table 2-4 describes their functions.

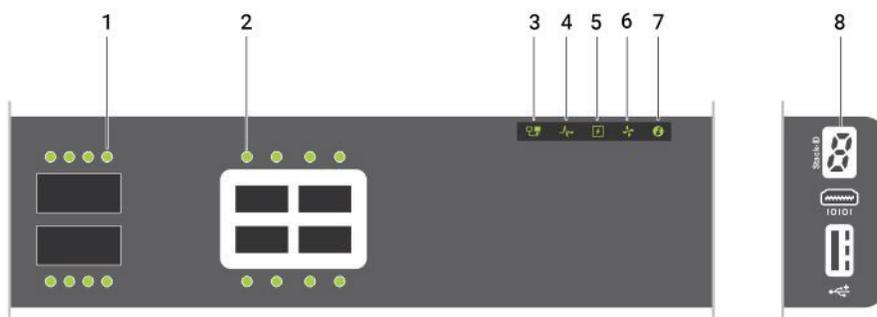


FIGURE 2-3. LEDS ON THE I/O SIDE OF THE SWITCH

**TABLE 2-4. LEDS ON THE I/O SIDE OF THE SWITCH**

NUMBER IN FIGURE 2-3	NAME OF LED	DESCRIPTION
1	Port activity LEDs	See Tables 2-6 through 2-12
2	Link (left), Activity (right) LEDs	See Tables 2-6 through 2-12
3	Master LED	<ul style="list-style-type: none"> <li>Off—Switch is in Stacking Slave mode</li> <li>• Solid green—System is in Stacking Master or Standalone mode</li> </ul>
4	System/Status Health LED	<ul style="list-style-type: none"> <li>• Solid green—Normal operation</li> <li>• Blinking green—Booting</li> <li>• Solid yellow—Critical system error</li> <li>• Blinking yellow—Non-critical system error, fan failure, or power supply failure</li> </ul>
5	Power LED	<ul style="list-style-type: none"> <li>• Off—No power</li> <li>• Solid Green—Normal</li> <li>• Solid yellow—POST is in process</li> <li>• Blinking yellow—Power supply failed</li> </ul>
6	Fan LED	<ul style="list-style-type: none"> <li>• Off—No power</li> <li>• Solid green—Normal operation; Fan powered and running at the expected RPM</li> <li>• Solid yellow—Fan failed, including incompatible airflow direction when you insert the PSU or fan trays with differing airflows</li> </ul>
7	Locator LED/System beacon	<ul style="list-style-type: none"> <li>• Off—Locator function is disabled</li> <li>• Blinking blue—Locator function is enabled</li> </ul>
8	Stack ID LED	<ul style="list-style-type: none"> <li>• Off—Switch is in Stacking Slave mode</li> <li>• Solid green—System is in Stacking Master or Standalone mode</li> </ul>

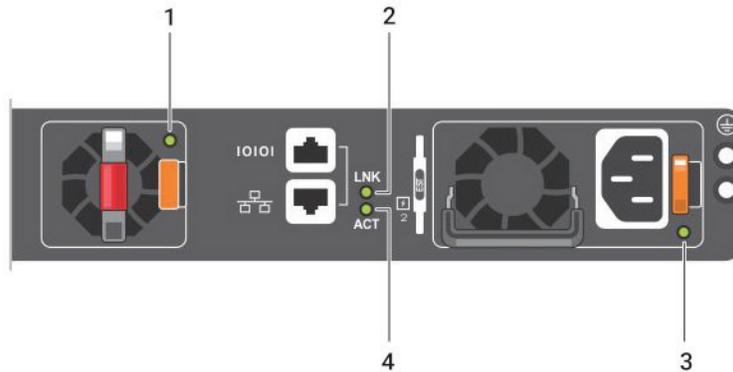


FIGURE 2-4. PSU SIDE LEDS ON THE SWITCH

TABLE 2-5. PSU SIDE LEDS ON THE SWITCH

NUMBER IN FIGURE 2-4	NAME OF LED	DESCRIPTION
1	Fan LED	<ul style="list-style-type: none"> <li>• Off—No power</li> <li>• Solid green—Normal operation; Fan powered and running at the expected RPM</li> <li>• Solid yellow—Fan failed, including incompatible airflow direction when you insert the PSU or fan trays with differing airflows</li> </ul>
2	Link LED	See Table 2-6
3	PSU LED	<ul style="list-style-type: none"> <li>• Off—No power</li> <li>• Solid green—Normal operation</li> <li>• Solid yellow—Power supply critical event causing a shutdown</li> <li>• Blinking yellow—PSU warning event; power continues to operate</li> <li>• Blinking green, 1.0 Hz — Standby mode</li> <li>• Blinking green, 0.5 Hz — AC power cord unplugged</li> </ul>
4	Activity LED	<ul style="list-style-type: none"> <li>• Off—No power</li> <li>• Solid green—Normal operation; Fan powered and running at the expected RPM</li> <li>• Solid yellow—Fan failed, including incompatible airflow direction when you insert the PSU or fan trays with differing airflows</li> </ul>

**TABLE 2-6. SYSTEM MANAGEMENT ETHERNET PORT LEDS**

NAME OF LED	DESCRIPTION
Link LED	• Off—No link
	• Solid green—Link operating at a maximum speed autonegotiated/forced or 1G port • Solid yellow—Link operating at a lower speed autonegotiated/force or 10/100 M port
Activity LED	• Off—No link • Flashing green—Port activity

**TABLE 2-7. SFP+ AND UNIFIED SFP+ LEDS**

NAME OF LED	DESCRIPTION
Link LED	• Off—No link
	• Solid green—Link operating at a maximum speed 10G port • Solid yellow—Link operating at a lower speed 1G port
Activity LED	• Off—No link • Flashing green—Port activity • Flashing yellow, 1 second ON/OFF—Port beacon

**TABLE 2-8. QSFP28 AND UNIFIED QSFP28 PORT LEDS**

NAME OF LED	DESCRIPTION
Link/Activity LED	• Off—No link
	• Solid green—Link operating at maximum speed—100G for QSFP28 port
	• Flashing green—Link activity operating at maximum speed— 100G port
	• Solid yellow—Link operating at a lower speed—40G or 10G port
	• Flashing yellow—Port activity at a lower speed—40G or 10G port
	• Flashing yellow, 1 second on/off—Port beacon

**TABLE 2-9. QSFP28 AND UNIFIED QSFP28 PORT LEDS: 4X25G OR 4X10G MODE**

NAME OF LED	DESCRIPTION
Link/Activity LED	• Off—No link
	• Solid green—Link operating at maximum speed—4 x 25G port
	• Flashing green—Link activity operating at maximum speed— 4 x 25G port
	• Solid yellow—Link operating at a lower speed—4 x 10G port
	• Flashing yellow, 1 second on/off—Port beacon

**TABLE 2-10. QSFP28 AND UNIFIED QSFP28 PORT LEDS: 2X50G MODE**

NAME OF LED	DESCRIPTION
Link/Activity LED	• Off—No link
	• Solid yellow—Link operating at a lower speed—2 x 50G port
	• Flashing yellow—Link activity at a lower speed—2 x 50G port

**TABLE 2-11. QSFP+ PORT LEDS**

NAME OF LED	DESCRIPTION
Link/Activity LED	<ul style="list-style-type: none"><li>• Off—No link</li><li>• Solid green—Link operating at maximum speed—40G port</li><li>• Flashing green— Link operating at a lower speed—40G port</li><li>• Flashing yellow—Link activity at a lower speed—40G port</li><li>• Flashing yellow, 1 second ON/OFF— Port beacon</li></ul>

**TABLE 2-12. QSFP+ PORT LEDS: 4X10G/1G MODE**

NAME OF LED	DESCRIPTION
Link/Activity LED—4x10G mode	<ul style="list-style-type: none"><li>• Off—No link</li><li>• Solid green—Link operating at maximum speed—10G port</li><li>• Flashing green— Link operating at a lower speed—10G port</li><li>• Solid yellow—Link activity at a lower speed—1G port</li><li>• Flashing yellow—Link activity at a lower speed—1G port</li><li>• Flashing yellow, 1 second ON/OFF— Port beacon</li></ul>



## CHAPTER 3: PREPARING THE SITE

The EMS10G-28 is suitable for installation as part of a common bond network (CBN).

You can install the switch in:

- ◆ Network telecommunications facilities
- ◆ Data centers
- ◆ Other locations where the National Electric Code (NEC) applies

NOTE: Install the EMS10G-28 switch into a rack or cabinet before installing any optional components.

### 3.1 SITE SELECTION

Install this equipment in restricted access areas.

A restricted access area is one in which service personnel can only gain access using a special tool, lock, key or other means of security. Also, access is controlled by the authority responsible for the location.

Ensure that the area where you install your EMS10G-28 switch meets the following safety requirements:

- ◆ Near an adequate power source. Connect the switch to the appropriate branch circuit protection as defined in your codes.
- ◆ Environmental continuous temperature range from 50 to 104° F (5 to 40° C).
- ◆ Operating humidity is from 5 to 85 percent noncondensing.
- ◆ In a dry, clean, well-ventilated and temperature controlled room away from heat sources such as hot air vents or direct sunlight.
- ◆ Away from sources of severe electromagnetic noise.
- ◆ Inside the restricted access area, positioned in a rack or cabinet, or on a desktop with adequate space in the front, rear, and sides for proper ventilation and access.
- ◆ Install the switch in information technology rooms in accordance with Article 645 of the National Electric Code and NFPA 75.

For more information about switch storage and environmental temperatures, see the Specifications chapter in this manual.

### 3.2 CABINET PLACEMENT

Install the EMS10G-28 only in indoor cabinets designed for use in a controlled environment.

Do not install the EMS10G-28 in outside cabinets. For cabinet placement requirements, see Site Selection.

The cabinet must meet minimum size requirements. Airflow must be in accordance with the Electronic Industries Alliance (EIA) standard. Ensure that there is a minimum of 5 inches (12.7 cm) between the intake and exhaust vents and the cabinet wall.

### 3.3 RACKMOUNTING

When you prepare your equipment rack, ensure that the rack is grounded.

Ground the equipment rack to the same ground point the power service in your area uses. The ground path must be permanent.

### 3.4 SWITCH GROUND

Black Box recommends you ground your switch. Use the EMS10G-28 in a common bond network (CBN).

Connect the grounding cables as described in Install the Switch.

## CHAPTER 3: PREPARING THE SITE

### 3.5 FANS AND AIRFLOW

The EMS10G-28 fans support two airflow options—normal and reverse.

Installation of the fans is done as part of the factory install. The EMS10G-28 supports the following configuration:

- ♦ AC PSU with fan airflow from the I/O to the PSU

For proper ventilation, position the EMS10G-28 in an equipment rack or cabinet with a minimum of 5 inches (12.7 cm) of clearance around the exhaust vents. The fan speed varies based on internal temperature monitoring. The EMS10G-28 never intentionally turns off the fans.

### 3.6 POWER

To connect the chassis to the applicable power source, use the appropriate power cord with the EMS10G-28. An AC power cord is included with the switch.

When installing AC switches, follow the requirements of the National Electrical Code, ANSI/NFPA 70 where applicable.

The switch is powered-up as soon as the power cord is connected between the switch and the power source.

**CAUTION:** Always disconnect the power cable before you service the power supply slots.

**CAUTION:** Use the power supply cord as the main disconnect device on the AC switch. Make sure that the socket outlet is located/installed near the equipment and is easily accessible.

### 3.7 STORING COMPONENTS

If you do not install your EMS10G-28 and components immediately, properly store the switch and all optional components by following these guidelines:

- ♦ Storage location temperature must remain constant. The storage range is from -40 to +149° F (-40 to +65° C).
- ♦ Store on a dry surface or floor, away from direct sunlight, heat and air conditioning ducts.
- ♦ Store in a dust-free environment.

**NOTE:** ESD damage can occur when components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the switch and its accessories. After you remove the original packaging, place the switch and its components on an anti-static surface.



## CHAPTER 4: INSTALLING THE SWITCH

To install the EMS10G-28 switch, complete the installation procedures in the order presented in this section.

Always handle the switch and its components with care. Avoid dropping the switch or any field replaceable units (FRUs).

NOTE: ESD damage can occur if components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the switch and its components. As with all electrical devices of this type, take all the necessary safety precautions to prevent injury when installing this switch.

NOTE: Before unpacking the switch, inspect the container and immediately report any evidence of damage.

### 4.1 UNPACKING STEPS

1. Place the container on a clean, flat surface and cut all straps securing the container.
2. Open the container or remove the container top.
3. Carefully remove the switch from the container and place it on a secure and clean surface.
4. Remove all packing material.
5. Inspect the product and accessories for damage.

### 4.2 RACK OR CABINET HARDWARE INSTALLATION

You may either place the switch on a rack shelf or mount the switch directly into a 19" wide, EIA-310- E-compliant rack—four-post, two- post, or threaded methods. The rack system is provided for 1U front-rack and two-post installations.

The rack system includes two separately packaged rail assemblies and two rails that are shipped attached to the sides of the switch.

WARNING: This is a condensed reference. Read the safety instructions in your Safety, Environmental, and Regulatory information booklet before you begin.

NOTE: The illustrations in this document are not intended to represent a specific switch.

NOTE: Do not the use the mounted rails as a shelf or a workplace.

#### 4.2.1 RACKMOUNT SAFETY CONSIDERATIONS

- ♦ Rack loading—Overloading or uneven loading of racks may result in shelf or rack failure, causing damage to the equipment and possible personal injury. Stabilize racks in a permanent location before loading begins. Mount the components beginning at the bottom of the rack, then work to the top. Do not exceed your rack's load rating.
- ♦ Power considerations—Connect only to the power source specified on the unit. When multiple electrical components are installed in a rack, ensure that the total component power ratings do not exceed the circuit capabilities. Overloaded power sources and extension cords present fire and shock hazards.
- ♦ Elevated ambient temperature—If installed in a closed rack assembly, the operating temperature of the rack environment may be greater than the room ambient temperature. Use care not to exceed the 113° F (45° C) maximum ambient temperature of the switch.
- ♦ Reduced air flow—Install the equipment in the rack so that the amount of airflow required for safe operation of the equipment is not compromised.
- ♦ Reliable earthing—Maintain reliable earthing of rack-mounted equipment. Pay particular attention to the supply connections other than the direct connections to the branch circuit, for example: use of power strips.
- ♦ Do not mount the equipment with the rear panel facing in the downward position.

## CHAPTER 4: INSTALLING THE SWITCH

### 4.2.2 RAILS SYSTEM INSTALLATION

The rackmounting system is provided to easily configure your rack for installation of your EMS10G-28 switch.

You can install the rail system using the 1U tool-less method or one of three 1U tooled methods—two-post flush mount, two-post center mount or four-post threaded.

To begin installation, separate each rail assembly by sliding the inside rail out of the outside rail.

NOTE: For more installation instructions, see the installation labels attached to the rail assembly.

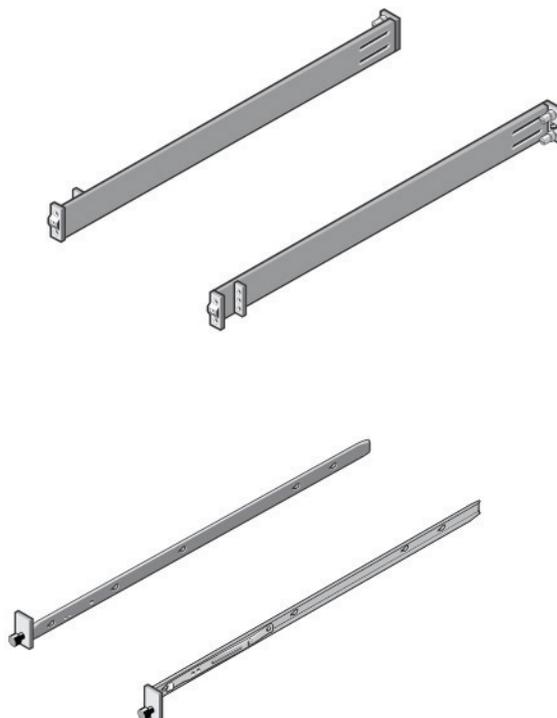


FIGURE 4-1. SEPARATE RAILS

## CHAPTER 4: INSTALLING THE SWITCH

### 1U TOOL-LESS MOUNT INSTALLATION

1. With the rail flange ears facing outward, place one rail between the left and right vertical posts.

Align and seat the rear flange rail pegs in the rear vertical post flange. In the following illustration, item 1 and its extractions show how the pegs appear in both the square and non-threaded round holes.

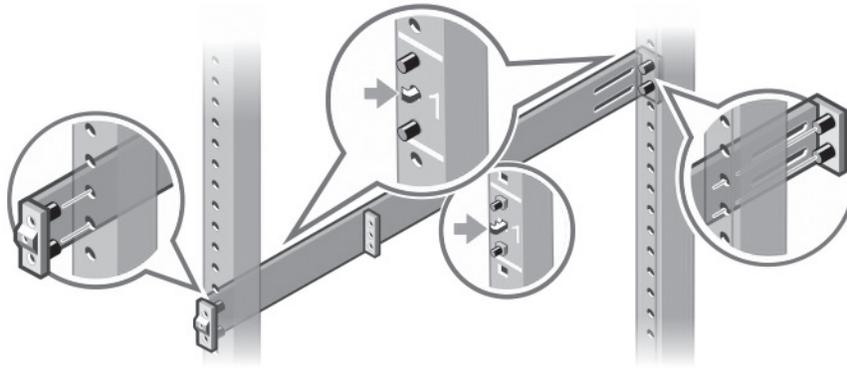


FIGURE 4-2. 1U TOOL-LESS CONFIGURATION

2. Align and seat the front flange pegs in the holes on the front side of the vertical post, item 2.

3. Repeat this procedure for the second rail.

4. To remove each rail, pull on the latch release button on each flange ear and unseat each rail, item 3.

## CHAPTER 4: INSTALLING THE SWITCH

### TWO-POST FLUSH MOUNT INSTALLATION

1. For this configuration, remove the castings from the front side of each rail assembly, item 1.

Use a Torx screwdriver to remove the two screws from each front flange ear on the switch side of the rail and remove each casting. Retain the castings for future rack requirements. It is not necessary to remove the rear flange castings.

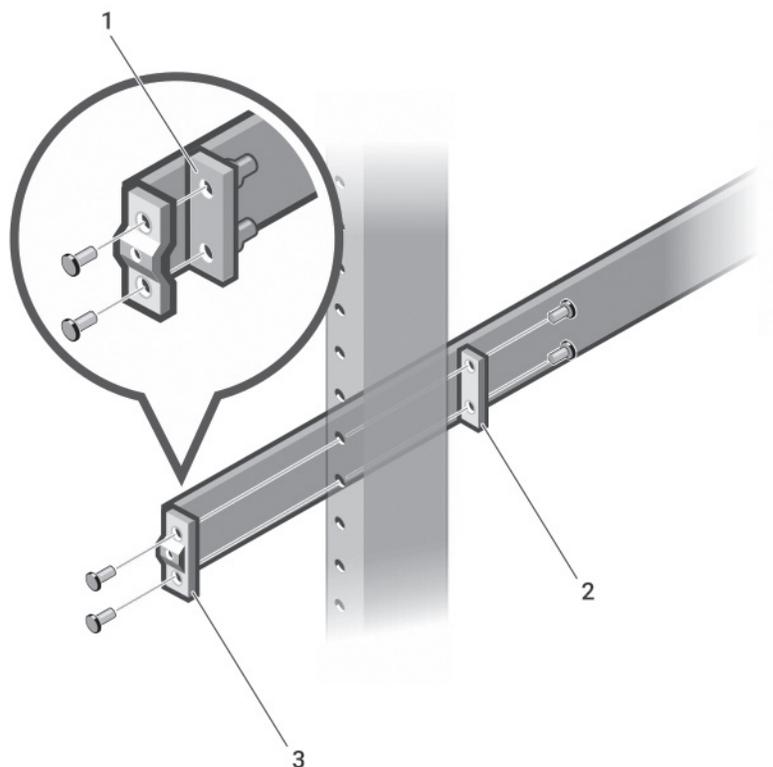


FIGURE 4-3. TWO-POST FLUSH-MOUNT CONFIGURATION

2. Attach one rail to the front post flange with two user-supplied screws, item 2.

3. Slide the plunger bracket forward against the vertical post and secure the plunger bracket to the post flange with two user-supplied screws, item 3.

4. Repeat this procedure for the second rail.

## CHAPTER 4: INSTALLING THE SWITCH

### TWO-POST CENTER MOUNT INSTALLATION

1. Slide the plunger bracket rearward until it clicks into place and secure the bracket to the front post flange with two user-supplied screws, item 1.

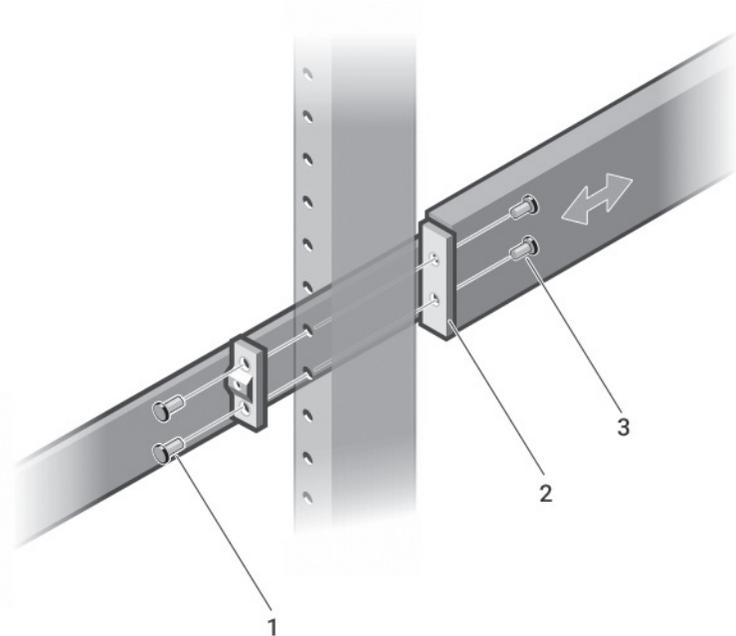


FIGURE 4-4. TWO-POST CENTER-MOUNT CONFIGURATION

2. Slide the back bracket towards the post. Secure it to the post flange with two user-supplied screws, to item 2.
3. Repeat this procedure for the second rail.

## CHAPTER 4: INSTALLING THE SWITCH

### FOUR-POST THREADED INSTALLATION

1. For this configuration, remove the flange ear castings from each end of the rail assemblies.

To remove the two screws from each flange ear and remove each casting, use a Torx driver, item 1. Retain the castings for future rack requirements.

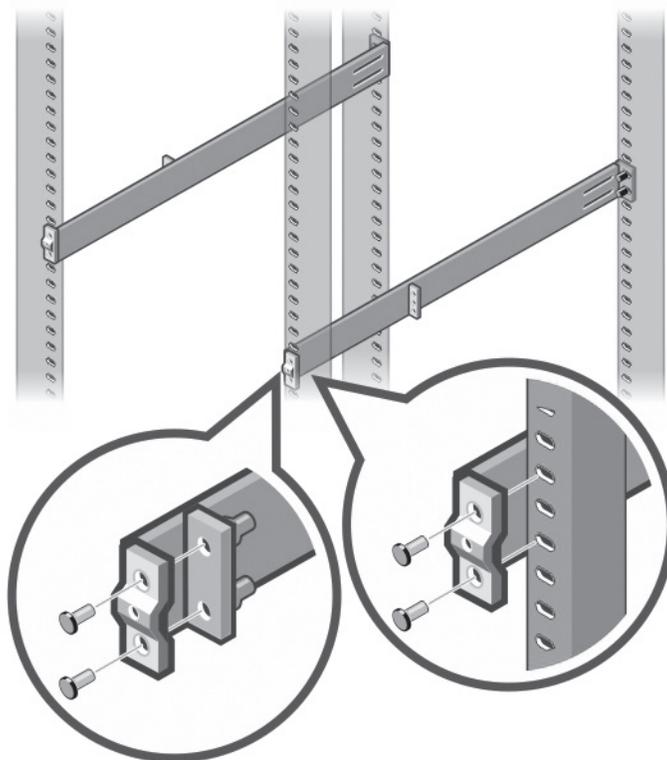


FIGURE 4-5. FOUR-POST THREADED CONFIGURATION

2. For each rail, attach the front and rear flanges to the post flanges with two user-supplied screws at each end, item 2.

## CHAPTER 4: INSTALLING THE SWITCH

### 4.3 SWITCH INSTALLATION

You can mount the switch in the 1U front-rack or 1U flush or center two-post configurations. Following is an example of a front-rack configuration.

For the 1U flush or center two-post configurations, slide the switch into the rails in the same manner as the four-post configurations.

#### 1U FRONT-RACK INSTALLATION

Configure the rails that are attached to the switch.

1. Attach the inner chassis members switch rails to the EMS10G-28 switch. Item 3 shows the detail for the front standoff with the locking tab.

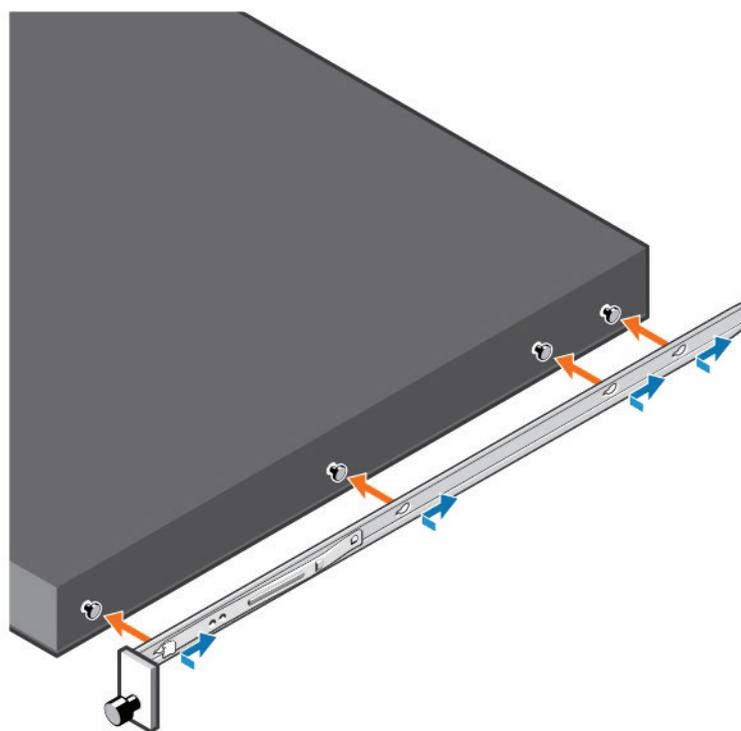


FIGURE 4-6. SWITCH RAILS ATTACHMENT

2. After you have installed both switch rails, line them up on the previously mounted rails and slide the switch in until it is flush with front of rack.

About three inches before you fully insert your switch, the rail locking feature engages to keep the switch from inadvertently sliding out of the rack and falling.

## CHAPTER 4: INSTALLING THE SWITCH

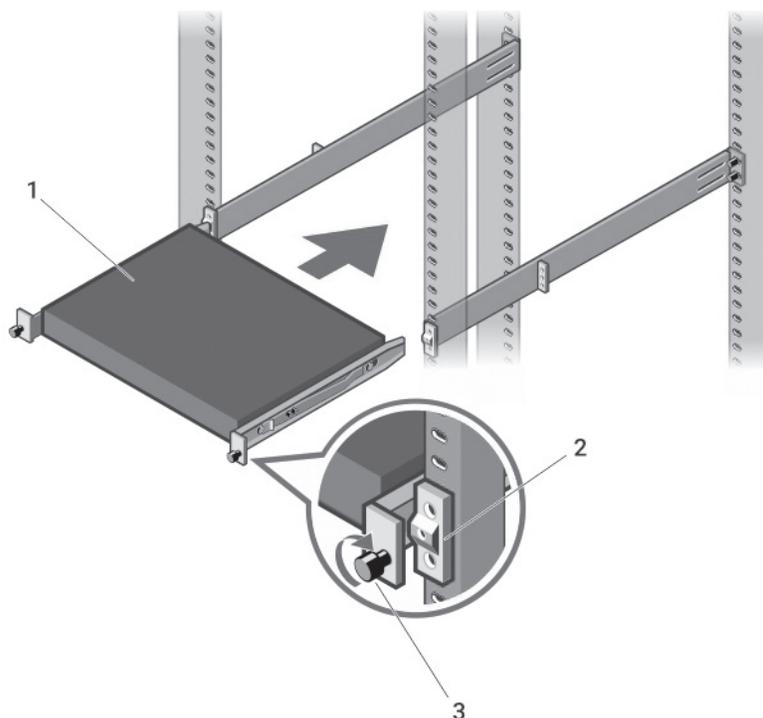


FIGURE 4-7. FRONT RACK INSTALLATION

NOTE: Do not use the mounted rails as a shelf or a workplace.

### 4.4 OPTICS INSTALLATION

The EMS10G-28 has four SFP+ optical ports.

The following SFP+ modules are compatible with the switch.

TABLE 4-1. COMPATIBLE SFPS

PRODUCT CODE	DESCRIPTION
LSP421	SFP+ - 10-Gb, Extended Diagnostics, 850-nm Multimode Fiber, 300-m, LC
LSP422	SFP+, 10GBASE-R, 1310-nm single-mode, 10 km
LSP431	SFP+, 10-Gb, Extended Operating Temperature & Diagnostics, 850-nm Multimode Fiber, 300-m

CAUTION: ESD damage can occur if components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the EMS10G-28 and its components.

WARNING: When working with optical fibers, follow all warning labels and always wear eye protection. Never look directly into the end of a terminated or unterminated fiber or connector as it may cause eye damage!

1. Position the optic so it is in the correct position. The optic has a key that prevents it from being inserted incorrectly.
2. Insert the optic into the port until it gently snaps into place.

NOTE: When you cable the ports, be sure not to interfere with the airflow from the small vent holes above and below the ports.

## CHAPTER 4: INSTALLING THE SWITCH

### 4.5 OPTICS REMOVAL

Remove an optic by pushing the tab on the optic and sliding the optic from the port.

When removing optics with direct attach cables (DACs) from the port, pull the release tab firmly and steadily. Before pulling the release tab, you may need to gently push the optic into the port to ensure it is seated properly. Do not jerk or tug repeatedly on the tab.

### 4.6 POWERING UP THE SWITCH

Supply power to the switch after it is mounted in a rack or cabinet.

Black Box recommends reinspecting your switch before powering up. Verify the following:

- ♦ The equipment is properly secured to the rack and properly grounded, optional.
- ♦ The equipment rack is properly mounted and grounded, optional.
- ♦ The ambient temperature around the unit, which may be higher than the room temperature, is within the limits specified for the switch. For more information, see Chapter 1, Specifications.
- ♦ There is sufficient airflow around the unit.
- ♦ The input circuits are correctly sized for the loads and that you use sufficient overcurrent protection devices.
- ♦ All protective covers are in place.
- ♦ Blank panels are installed if you do not install optional modules.

NOTE: Do not power up the switch if you did not install a fan module.

NOTE: A US AC power cable is included for powering up an AC power supply. You must order all other power cables separately.

NOTE: ESD damage can occur if components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the switch and its components.

#### POWER-UP SEQUENCE

When the switch powers up, the fans immediately come on at high speed. The fan speed slows as the switch continues to boot up.

### 4.7 AFTER SWITCH INSTALLATION

To configure your switch, after you have securely installed and powered on the EMS10G-28 switch, see your open network installation environment (ONIE)-compatible operating system documentation.

### 4.8 SWITCH REPLACEMENT

The following steps describe removing and replacing a switch. For further assistance when replacing a switch, contact Black Box Technical Support at 877-877-2269 or [info@blackbox.com](mailto:info@blackbox.com)

NOTE: ESD damage can occur when components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the switch and accessories. After you remove the original packaging, place the switch and components on an anti-static surface.

## CHAPTER 4: INSTALLING THE SWITCH

1. Back up the switch configuration to your back-up computer or laptop TFTP server.

```
copy running-config tftp://hostip/filepath
```

To establish a console connection to the switch CLI, assign an IP address on the switch network.

2. Disconnect the power source.
3. Label and remove all cables.
4. Remove the switch from the rack.

At the same time, press in the two side-release bars on the switch and slide the switch forward. If you are using the fan trays or PSUs in the replacement switch, remove them from the switch.

5. Unpack the new switch. For more information, see Unpack.
6. Confirm that the software version of the replacement switch is the same as the previously installed switch.

```
show os-version
```

If the software versions do not match, upgrade the replacement switch software using the procedure included with the firmware download.

7. Copy the backed-up switch configuration to the new switch.

```
copy tftp://hostip/filepath running-config
```

8. Install the new switch in your rack or cabinet.

If you are using the fan trays or PSUs from the removed switch, reinsert them in the replacement switch.

9. Connect all the cables.

10. Power on the switch.

For more information, see Section 4.6, Powering On the Switch.

The EMS10G-28 switch ships with two AC power supplies.

The power supplies with two air-flow directions: normal and reverse. Normal is from the I/O side to the PSU side. Reverse is from the PSU side to the I/O side.

The PSUs are field replaceable. When running with full redundancy—two power supplies installed and running, you can remove and replace one PSU without disrupting traffic.

**CAUTION:** To prevent electrical shock, ensure that the switch is grounded properly. If you do not ground your equipment correctly, excessive emissions may result. Use a qualified electrician to ensure that the power cables meet your local electrical requirements.

**NOTE:** If you use a single PSU, install a blank plate in the other PSU slot. Black Box recommends using power supply 2 (PSU2) as the blank plate slot. Use a #1 Philips screw driver to install the blank plate.

**NOTE:** ESD damage can occur if components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the EMS10G-28 and its components.



## CHAPTER 5: POWER SUPPLIES

### 5.1 COMPONENTS

The following power supply is available for the EMS10G-28 switch:

- ♦ AC power supply with integrated fan

Power supply 1 (PSU1) is on the left side of the chassis; power supply 2 (PSU2) is on the right side of the chassis.



FIGURE 5-1. EMS10G-28 SWITCH PSUS

#### PSU 1 and 2

The PSUs have an integrated fan that you cannot replace individually. If the fan integrated in a PSU fails, you must replace the entire PSU. You can replace the fan trays individually. For fan tray replacement procedures, see Fans.

**WARNING:** Prevent exposure and contact with hazardous voltages. Do not attempt to operate this switch with the safety cover removed.

**CAUTION:** Remove the power cable from the PSU prior to removing the PSU. Also, do not connect the power cable before you insert the PSU in the chassis.

**NOTE:** To comply with the GR-1089 Lightning Criteria for Equipment Interfacing with AC Power Ports, use an external surge protection device (SPD) at the AC input of the router.

#### PSU LEDs

- ♦ Solid green: Input is OK.
- ♦ Flashing yellow: There is a fault with the PSU.
- ♦ Flashing green blink at 1 Hz: Switch is in standby/CR state.
- ♦ Off: PSU is off.

### 5.2 AC POWER SUPPLY INSTALLATION

**NOTE:** The PSU slides into the slot smoothly. Do not force a PSU into a slot as this action may damage the PSU or the switch chassis.

**NOTE:** Make sure that you correctly install the PSU. When you install the PSU correctly, the power connector is on the right side of the PSU.

**NOTE:** If you use a single PSU, install a blank plate in the other PSU slot. If you are only using one power supply, Black Box recommends installing the power supply in the first slot (PSU1) and installing a blank plate in the second slot (PSU2).

1. Remove the PSU slot cover from the switch using a small #1 Phillips screwdriver.
2. Remove the PSU from the electro-static bag.
3. Insert the PSU into the switch PSU slot. Insert the PSU exposed PCB edge connector first. The PSU slot is keyed so that the PSU can only be fully inserted in one orientation.

## CHAPTER 5: POWER SUPPLIES

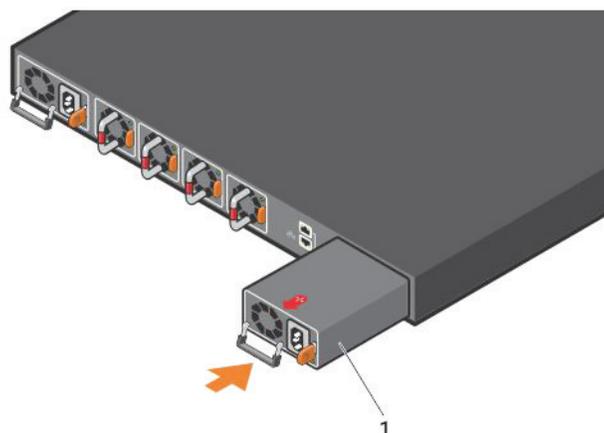


FIGURE 5-2. PSU INSTALLATION

When you install the PSU correctly, it snaps into place and is flush with the back of the switch.

NOTE: Left PSU is PSU 1 and right PSU is PSU 2.

4. Plug in the appropriate AC three-prong power cord from the switch PSU to the external power source.

5. If you have a redundant PSU, repeat steps 1 through 4 above using the second PSU slot on the switch.

NOTE: The switch powers up when you connect the cables between the power supply and the power source.

### 5.3 AC POWER SUPPLY REPLACEMENT

CAUTION: Disconnect the power cord before removing the power supplies. Also, disconnect all power cords before servicing.

NOTE: The PSU slides into the slot smoothly. Do not force a PSU into a slot as this action may damage the PSU or the switch chassis.

NOTE: If a PSU fails, you must replace the entire unit. There are no field serviceable components in the PSU. To request a hardware replacement, contact Black Box Technical Support at 877-877-2269 or [info@blackbox.com](mailto:info@blackbox.com)

NOTE: If you use a single PSU, install a blank plate in the other PSU slot. If you are only using one power supply, we recommend installing the power supply in the first slot (PSU1) and installing a blank plate in the second slot (PSU2).

1. Disconnect the power cable from the PSU.

2. Use the grab handle to slide the PSU out of the power supply bay.

3. Use the grab handle on the replacement PSU to slide it into the power supply bay.

4. Attach the power cord to the replacement PSU.

NOTE: The switch powers up when you connect the cables between the power supply and the power source.

## CHAPTER 6: FANS

The switch comes from the factory with two PSUs and four fan modules installed in the chassis. The fan modules and the power supplies, which have integrated fans, are hot-swappable.

In addition to the power supply modules, you can order and install fan modules separately.

- ♦ Normal—airflow is from the I/O panel to the PSU.

All fans and PSUs in a configuration must be in the same airflow direction.

Environmental factors can decrease the amount of time required between fan replacements. Check the environmental factors regularly. An increase in temperature and/or particulate matter in the air might affect performance; for example, new equipment installation.

**CAUTION:** Check the fans at six-month intervals and replace them as necessary. Regularly monitor the speeds of the fans to accurately determine replacement intervals.

### 6.1 COMPONENTS

The following are the EMS10G-28 fan components.

- EMS10G-28 Fan module
- EMS10G-28 Fan module—Reverse flow

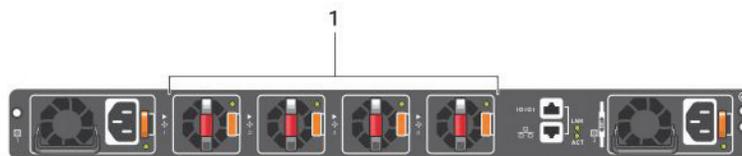


FIGURE 6-1. FAN MODULES

#### FAN LEDs

- ♦ Solid green: Fan function is normal.
- ♦ Flashing yellow: There is a fan fault.
- ♦ Off: Fan is off.

## CHAPTER 6: FANS

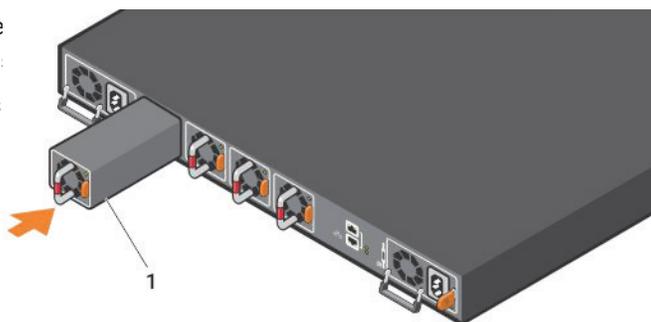
### 6.2 FAN MODULE INSTALLATION

The fan modules in the switch are field replaceable.

Module slot 1 is on the left side of the chassis, module slots 2 and 3 are in the middle of the chassis, and module slot 4 is on the right side of the chassis.

**CAUTION:** DO NOT mix airflow direction, the switch detects the direction.

1. Take the fan module out of the slot.
2. Slide the module into the bay.



or normal. If you mix the airflow direction, the switch detects the direction.

FIGURE 6-2. FAN MODULE INSTALLATION

### 6.3 FAN MODULE REPLACEMENT

**CAUTION:** Complete steps 1 and 2 within one minute or the switch powers down.

1. Slide the fan module out of the bay.
2. Slide the replacement module into the bay.

## CHAPTER 7: MANAGEMENT PORTS

Besides the 10/100/1000BASE-T RJ-45 ports, the switch provides several ports for management and storage.

NOTE: The output examples in this section are for reference only. Your output may vary.

### 7.1 RS-232 CONSOLE PORT ACCESS

The RS-232 console port is on the I/O-side of the switch chassis, as shown.



FIGURE 7-1. SWITCH RS-232 CONSOLE PORTS

1. RS-232 Console Port, top
2. Ethernet management port, bottom

NOTE: Make sure that any equipment attached to the serial port can support the required 115200 baud rate.

NOTE: Before starting this procedure, make sure that your PC has a 9-pin serial port and that you have a terminal emulation program already installed and running on the PC.

NOTE: If your PC's serial port cannot accept a female DB9 connector, acquire a DB9 male-to-male adapter.

1. Install the provided RJ-45 connector side of the provided cable into the switch console port.
2. Install the DB9 female side of the provided copper cable into your PC's serial port or into other data terminal equipment (DTE) server hardware that you intend to use.
3. Keep the default terminal settings on the console as follows:
  - ◆ 115200 baud rate
  - ◆ No parity
  - ◆ 8 data bits
  - ◆ 1 stop bit
  - ◆ No flow control

#### 7.1.1 USB-B CONSOLE PORT ACCESS

The USB-B console port is on the I/O side of the switch.

The terminal settings are the same for the serial console port and the RS-232/RJ-45 console port:

- ◆ 115200 baud rate
- ◆ No parity
- ◆ 8 data bits
- ◆ 1 stop bit
- ◆ No flow control

## CHAPTER 7: MANAGEMENT PORTS

When you connect the USB-B port, it becomes the primary connection and, while connected, all messages are sent to the USB-B port.

**NOTE:** Before starting this procedure, be sure you have a terminal emulation program already installed on your PC. You will need to install the appropriate drivers to support the USB-B port. For assistance, contact Black Box Technical Support at 877-877-2269 or [info@blackbox.com](mailto:info@blackbox.com) to download the drivers.

To access the USB-B console port, follow these steps.

1. Power on the PC.
2. Connect the USB-A end of cable into an available USB port on the PC.
3. Connect the USB-B end of cable into the USB-B console port on the switch.
4. Power on the switch.
5. Install the necessary USB device drivers.

To download the drivers, contact Black Box Technical Support at 877-877-2269 or [info@blackbox.com](mailto:info@blackbox.com)

6. Open your terminal software emulation program to access the switch.
7. Confirm the terminal settings on your terminal software emulation program are as follows:

- ♦ 115200 baud rate
- ♦ No parity
- ♦ 8 data bits
- ♦ 1 stop bit
- ♦ No flow control

### 7.1.2 USB STORAGE MOUNT

The USB storage supports the FAT file system. The USB storage does not automatically mount. To use USB storage, you must first mount the device.

1. Create a mount directory for the USB.

```
ONIE:/ # mkdir /mnt/usb
```

2. View the fixed disks using the fdisk command.

```
ONIE:/mnt # fdisk -l
```

For internal storage:

```
Disk /dev/sda: 15.8 GB, 15829303296 bytes
255 heads, 63 sectors/track, 1924 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
```

```
Device Boot  Start  End  Blocks      Id System
/dev/sda1    1     1925  15458303+  ee  EFI GPT
```



## CHAPTER 7: MANAGEMENT PORTS

For USB storage:

```
Disk /dev/sdb: 30.9 GB, 30942946304 bytes
64 heads, 32 sectors/track, 29509 cylinders
Units = cylinders of 2048 * 512 = 1048576 bytes
Device Boot Start End Blocks Id System
```

3. Mount the device `/dev/sdb` to the `/mnt/usb` directory.

```
ONIE:/ # mount -t vfat /dev/sdb /mnt/usb
```

NOTE: The following message displays if the `/mnt/usb` directory is missing:

```
mount: mounting /dev/sdb on /mnt/usb failed: No such file or directory.
```

NOTE: The following message displays if the USB device is not seen:

```
mount: mounting /dev/sdb on /mnt/usb failed: No such device or address.
```

4. Add a device to the file systems table, `fstab`, and mount the file systems—recommended.

```
ONIE:/ # vi /etc/fstab
```

```
# FSTAB entry for the ONIE-BOOT partition mounted on /boot
LABEL=ONIE-BOOT /mnt/onie-boot ext4 defaults,rw,errors=remount-ro 0 1
/dev/sdb /mnt/usb vfat defaults 0 1
ONIE:/ # mount -a
```

### 7.2 BEFORE YOU INSTALL AN OS

After powering on the switch, it goes through a power-on self-test (POST).

POST runs every time the switch is initialized and checks the hardware components to determine if the switch is fully operational before booting. After POST, the switch uses the Grub bootloader.

To select an entry, use the up and down arrow keys. Press Enter to select an OS or enter `e` to edit the commands before booting. Enter `c` for a command line. The highlighted entry executes automatically in the operating system.

## CHAPTER 7: MANAGEMENT PORTS

### 7.2.1 EXAMPLE OF THE GRUB BOOTLOADER

---

```
GNU GRUB version 2.02~beta2+e4a1fe391
+-----+
|*ONIE: Install OS           |
| ONIE: Rescue              |
| ONIE: Uninstall OS        |
| ONIE: Update ONIE         |
| ONIE: Embed ONIE          |
| ONIE: Diag ONIE           |
| ONIE: Diag ONIE           |
+-----+
```

Your switch comes with ONIE installed.

### 7.2.2 EXAMPLE OF ONIE

---

```
ONIE: Install OS
      For downloading and installing an OS from a URL
      Starts ONIE with ONIE Discovery Service
      (factory default boot)
ONIE: Rescue
      Starts ONIE without ONIE Discovery Service Useful for running Diagnostics manuell
ONIE: Uninstall OS Restore to factory defaults erases any installed OS
ONIE: Update ONIE For downloading and updating ONIE from a URL
ONIE: Embed ONIE For downloading and updating ONIE from a URL and erases any installed O
ONIE: Diag ONIE Run Diagnostic package for EMS10G-28
Run Black Box Networking Diagnostic package for <platform>
```

During the initial setup, the switch boots to ONIE Install. ONIE Install boots with ONIE Discovery to the console (ONIE:).

### 7.2.3 ONIE SERVICE DISCOVERY

---

ONIE attempts to locate the installer through several discovery methods, as shown. To download and run an installer, the ONIE Service Discovery feature uses the first successful method found.

1. Passed from the boot loader.
2. Search locally attached storage devices for one of the ONIE default installer filenames; for example, USB.
3. Exact URLs from DHCPv4.
4. Inexact URLs based on DHCPv4 responses.
5. Query to IPv6 link-local neighbors using HTTP for an installer.
6. TFTP waterfall—from DHCPv4 option 66



## CHAPTER 7: MANAGEMENT PORTS

### Examples of the ONIE ifconfig eth0 Commands

If none of the ONIE Service Discovery methods are successful, you can disable this using the `onie-discovery-stop` command.

You can install an operating system manually from HTTP, FTP, or TFTP using the `onie-nos-install <URL>` command.

NOTE: If you have a recovery USB plugged into your switch, you must remove it before installing the DIAG-OS using the `onie-nos-install` command.

The ONIE Install environment uses DHCP to assign an IP address to the management interface, eth0. If that fails, it uses the default IP address 192.168.3.10/255.255.255.0.

To display the IP address, use the `ifconfig eth0` command, as shown.

```
ONIE:/ # ifconfig eth0
eth0 Link encap:Ethernet HWaddr 90:B1:1C:F4:9C:76
    inet addr:10.11.53.33 Bcast:10.255.255.255 Mask:255.0.0.0
    inet6 addr: fe80::92b1:1cff:fef4:9c76/64 Scope:Link
    UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
    RX packets:18 errors:0 dropped:0 overruns:0 frame:0
    TX packets:24 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000
    RX bytes:1152 (1.1 KiB) TX bytes:6864 (6.7 KiB)
    Interrupt:21 Memory:ff300000-ff320000
```

To assign an IP address to the management interface, eth0, and verify network connectivity, use the `ifconfig eth0 <ip address>` command, as shown.

```
ONIE:/ # ifconfig eth0 10.11.53.33/16
Verify the network connection with ping.
ONIE:/ # ping 10.11.8.12
PING 10.11.8.12 (10.11.8.12): 56 data bytes
64 bytes from 10.11.8.12: seq=0 ttl=62 time=1.357 ms
64 bytes from 10.11.8.12: seq=1 ttl=62 time=0.577 ms
```

## CHAPTER 8: TROUBLESHOOTING

### 8.1 CONTACTING BLACK BOX

If you determine that your switch is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box Technical Support at 877-877-2269 or [info@blackbox.com](mailto:info@blackbox.com).

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- ♦ the nature and duration of the problem.
- ♦ when the problem occurs.
- ♦ the components involved in the problem.
- ♦ any particular application that, when used, appears to create the problem or make it worse.

### 8.2 SHIPPING AND PACKAGING

If you need to transport or ship your switch:

- ♦ Package it carefully. We recommend that you use the original container.
- ♦ If you are returning the unit, make sure you include everything you received with it. Before you ship for return or repair, contact Black Box to get a Return Authorization (RA) number.



## APPENDIX A: REGULATORY INFORMATION

### A.1 USA FEDERAL COMMUNICATIONS COMMISSION STATEMENT

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designated to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy. If it is not installed and used in accordance to the instructions, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to take whatever measures necessary to correct the interference at their own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Dell Networking is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications in the equipment. Unauthorized changes or modification could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



## APPENDIX A: REGULATORY INFORMATION

### A.2 NOM STATEMENT

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
  - A: El cable de poder o el contacto ha sido dañado; u
  - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
  - C: El aparato ha sido expuesto a la lluvia; o
  - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
  - E: El aparato ha sido tirado o su cubierta ha sido dañada.



## APPENDIX A: REGULATORY INFORMATION

### A.3 EUROPEAN UNION EMC DIRECTIVE CONFORMANCE STATEMENT

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Black Box can not accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of this product, including the fitting of non-Black Box option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/ European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

WARNING: This is a Class A product. In a domestic environment, this device may cause radio interference, in which case, you may be required to take adequate measures.

### A.4 JAPAN VCCI COMPLIANCE FOR CLASS A EQUIPMENT

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

This is Class A product based on the standard of the Voluntary Control Council For Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

WARNING: Use the AC power cords with Black Box equipment only.

本製品に同梱いたしております電源コードセットは、本製品専用です。本電源コードセットは、本製品以外の製品ならびに他の用途でご使用いただくことは出来ません。製品本体には同梱された電源コードセットを使用し、他製品の電源コードセットを使用しないで下さい。

## APPENDIX A: REGULATORY INFORMATION

### A.5 KOREAN CERTIFICATION OF COMPLIANCE

A급 기기 (업무용 방송통신기자재)	이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
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### A.6 SAFETY CERTIFICATIONS AND COMPLIANCE AGENCY CERTIFICATIONS

- ◆ CUS UL 60950-1, 2nd Edition – Meets or exceeds Hi Pot and Ground Continuity testing per UL 60950-1.
- ◆ CSA 60950-1-03, 2nd Edition
- ◆ EN 60950-1, 2nd Edition
- ◆ EN 60825-1, 1st Edition
- ◆ EN 60825-1 Safety of Laser Products—Part 1: Equipment Classification Requirements and User's Guide
- ◆ EN 60825-2 Safety of Laser Products—Part 2: Safety of Optical Fibre Communication Systems
- ◆ FDA Regulation 21CFR 1040.10 and 1040.11
- ◆ IEC 60950-1, 2nd Ed, including all National Deviations and Group Differences

### A.7 ELECTROMAGNETIC COMPATIBILITY

#### A.7.1 EMISSIONS

- ◆ International: CISPR 22: 2006, Class A
- ◆ Australia/New Zealand: AS/NZS CISPR 22:2009, Class A
- ◆ Canada: ICES-003, Issue-4, Class A
- ◆ Europe: EN55022 2006 (CISPR 22: 2006), Class A
- ◆ Japan: VCCI V-3/2011.04 Class A
- ◆ USA: FCC CFR47 Part 15, Subpart B, Class A

## APPENDIX A: REGULATORY INFORMATION

### A.7.2 IMMUNITY

- ◆ EN 300 386 v1.5.1:2010 EMC for Network Equipment
- ◆ EN55022 2006, Class A
- ◆ EN 55024 1998 + A1: 2001 + A2: 2003
- ◆ EN 61000-3-2 Harmonic Current Emissions
- ◆ EN 61000-3-3 Voltage Fluctuations and Flicker
- ◆ EN 61000-4-2 ESD
- ◆ EN 61000-4-3 Radiated Immunity
- ◆ EN 61000-4-4 EFT
- ◆ EN 61000-4-5 Surge
- ◆ EN 61000-4-6 Low Frequency Conducted Immunity

### A.8 PRODUCT RECYCLING AND DISPOSAL (WEEE)

You must recycle or discard this system according to applicable local and national regulations. Black Box encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed.

#### Waste Electrical and Electronic Equipment (WEEE) Directive for Recovery, Recycle and Reuse of IT and Telecommunications Products

Black Box switches are labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.



## APPENDIX B: DISCLAIMER/TRADEMARKS

### B.1 DISCLAIMER

Black Box Corporation shall not be liable for damages of any kind, including, but not limited to, punitive, consequential or cost of cover damages, resulting from any errors in the product information or specifications set forth in this document and Black Box Corporation may revise this document at any time without notice.

### B.2 TRADEMARKS USED IN THIS MANUAL

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Any other trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.









