

HARDWARE INSTALLATION GUIDE

EMS1G24F

24-PORT 1G IP NETWORK SWITCH

24/7 TECHNICAL SUPPORT AT 1.877.877.2269 OR VISIT BLACKBOX.COM



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SAFETY INSTRUCTIONS

This guide provides site preparation recommendations, step-by-step procedures for rackmounting 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

24-PORT 1G NETWORK SWITCH (EMS1G24F) SPECIFICATIONS	
APPROVALS	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
ENVIRONMENTAL	Operating Humidity: 8 to 85% (RH), noncondensing Operating Temperature: 32 to 113° F (0 to 45° C) Storage Humidity: 5 to 90% (RH), noncondensing Storage Temperature: -40 to +158° F (-40 to +70° C); Maximum Thermal Output: 137.88 BTU/hr.; Maximum Operational Altitude: 10,000 ft. (3048 m); Maximum Non-Operational Altitude: 39,370 ft. (12,000 m)
MANAGEMENT	Network Management: SMIv1, SNMPv1, Concise MIB Definitions, SNMP Traps, Bridges MIB, OSPFv2 MIB, Community-Based SNMPv2, IP MIB, IP Forwarding Table MIB, SMIv2, Textual Conventions for SMIv2; Security/Authentication: RADIUS, RADIUS and IPv6, Radius support for EAP, 802.1X with RADIUS, EAP, AES Cipher Algorithm in the SNMP User Base Security Model, SSHv2, Security Architecture for IPsec, IPsec Authentication Header, ESP Protocol, IPsec Security Policy DB MIB Type
PERFORMANCE	Switching Capacity: 212 Gbps; Forwarding capacity: Up to 158 Mpps (Full Duplex); Packet buffer memory: 4 MB; CPU memory: 2 GB; Flash memory: 1 GB; MAC addresses: 56 K
PHYSICAL	Connectors/Interfaces: (24) 1-Gbps Ethernet SFP ports, (2) SFP+ 10 GbE/1 GbE cages, (1) RJ-45 serial console management port, (1) 10/100/1000BT Ethernet port for management, (1) USB 2.0 Type A storage port, (1) micro USB Type B for console/management port access Dimensions: 1.71" H (1 RU) x 17.09" W x 16.02" D (4.4 x 43.4 x 40.7 cm) Mounting: Rackmounted Weight: 13.45 lb. (6.1 kg), including power modules
POWER	Input: 100–240 VAC, 50/60 Hz Max. Power Consumption (excluding PoE power): 63 W; Max.Current Draw per System (excluding PoE power): 0.40 W at 40.41 W/100 VAC, 0.20 W at 40.41 W/200 VAC; Max. Power Consumption: 200 W (including PoE); Power Supply Type: (2) hot-swappable redundant AC power
STANDARDS	LLDP, Bridging, STP, L2 Prioritization, VLAN Tagging, Double VLAN Tagging, GVRP, PFC, ETS, MSTP, RSTP, Network Access Control, Gigabit Ethernet (1000BASE-T) or breakout, Frame extensions for VLAN Tagging, Link Aggregation with LACP, MORE; ANSI/TIA-1057 LLDP-MED, Force10 PVST+. Jumbo MTU support 9.416 bytes; MTU support 12,000 bytes



CHAPTER 2: OVERVIEW

2.1 INTRODUCTION

The EMS1G24F is a low-cost switch for 1 Gbps fiber links to servers, 1G copper combo ports for campus network endpoints, and 10 Gbps fiber uplinks to core/aggregation switches.

2.2 FEATURES

- ♦ Twenty-four 100BASE-FX/1000BASE-X SFP ports
- ♦ Two 1G copper combo ports
- ♦ Two SFP+ 10G ports
- ♦ One RS-232 serial console port
- ♦ One universal serial bus 2.0 (USB Type-A) port
- ♦ One front-panel Out-of-Band (OOB) management port
- ♦ Hot-swappable redundant power supply unit (PSU)
- ♦ Hot-swappable fan tray
- ♦ Standard 1U chassis
- ♦ Non-blocking access
- ♦ I/O panel to PSU airflow

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

- ♦ (1) EMS1G24F Switch
- ♦ (1) RJ-45 to DB9 female cable
- ♦ (1) rail kit for rack installation: (2) mounting brackets, bolts, and cage nuts
- ♦ (1) set of self-adhesive rubber mounting pads for free-standing installation ([4] pads are included)
- ♦ (1) PSU, a second PSU is sold separately
- ♦ (2) fan units
- ♦ (1) AC country/region-specific power cord

2.4 ADDITIONAL ITEMS YOU WILL NEED

- ♦ (24) 1G SFP modules and up to (2) 10G SFP modules for the fiber ports
- ♦ Copper/fiber cables
- ♦ Extra power supply
- ♦ Extra fan module
- ♦ Extra mounting brackets if installing in a four-post rack or cabinet



CHAPTER 2: OVERVIEW

2.5 COMPATIBLE SFP MODULES

Your switch will support the following 1G SFPs on its (24) SFP ports and (2) combo ports. The switch also supports 10G SFPs on its 10G uplink ports.

COMPATIBLE SFPS		
PART NUMBER	DESCRIPTION	DISTANCE
1-GBPS CONNECTIONS		
LFP417	SFP 1250-Mbps, 1000BASE-T, RJ-45	100 m
LFP411	SFP 1250-Mbps, 850-nm Multimode Fiber, LC	550 m
LFP420	SFP 1250-Mbps, 1550-nm TX, 1310-nm RX, Single-Mode Fiber, LC	10 km
LFP441	SFP, Gigabit Ethernet, 850-nm Multimode Fiber, LC	550 m
LFP442	SFP, Gigabit Ethernet, 1310-nm Single-mode Fiber, LC	20 km
LFP443	SFP, 10/100/1000BASE-T RJ-45 SGMII	100 m
10-GBPS CONNECTIONS		
LSP421	SFP+ - 10-Gb, Extended Diagnostics, 850-nm Multimode Fiber, LC	300 m
LSP422	SFP+ - 10-Gb, Extended Diagnostics, 1310-nm Single-mode Fiber, LC,	10 km
LSP441	SFP+ - 10-Gb, Extended Diagnostics, 850-nm Multimode Fiber, LC	300 m
LSP442	SFP+ - 10-Gb, Extended Diagnostics, 1310-nm Single-mode Fiber, LC	10 km
LSP443	SFP+, 10GBASE-T, RJ-45	30 m

NOTE: Black Box switches will also support generic SFP+ modules.

2.6 HARDWARE DESCRIPTION

2.6.1 FRONT PANEL

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

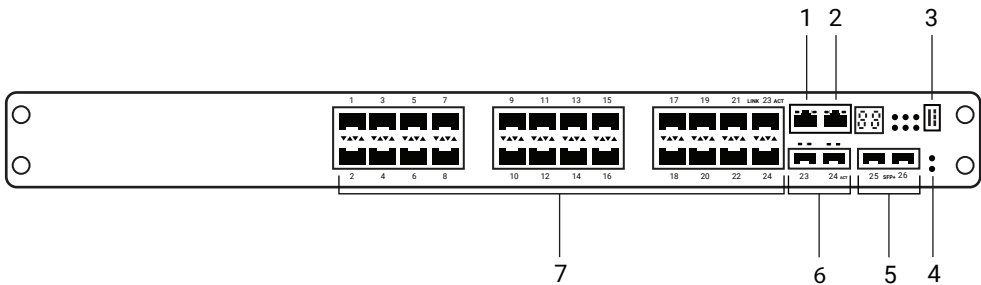


FIGURE 2-1. FRONT PANEL OF THE SWITCH

TABLE 2-1. FRONT PANEL COMPONENTS

NUMBER IN FIGURE 2-1	COMPONENT	DESCRIPTION
1	(1) RJ-45 port	Links to serial console
2	(1) RJ-45 port	Management port
3	(1) USB 2.0 port	Console Port (becomes primary console port when connected)
4	(1) Reset button	Press to reset the switch
5	(2) 10G SFP+ ports	10G SFP+ modules (not included) install here
6	(2) 1G copper combo ports	Dual-media ports, each consisting of (1) 10-/100-/1000-Mbps RJ-45 and (1) 100/1000 SFP
7	(24) 1G SFP ports	1G SFP modules (not included) install here to link to 100BASE-FX/1000BASE-X devices

2.6.2 BACK PANEL

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

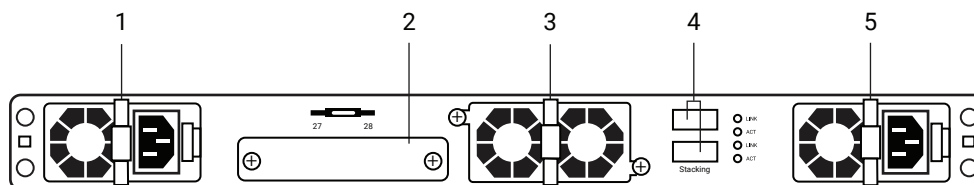


FIGURE 2-2. BACK PANEL OF THE SWITCH

TABLE 2-2. BACK PANEL COMPONENTS

NUMBER IN FIGURE 2-2	COMPONENT	DESCRIPTION
1	(1) power supply	Provides power to the switch
2	(1) module slot	Supports an optional small form-factor pluggable plus (SFP+) 2-port 10GBASE-T RJ-45 hot swappable uplink module 2-port 10GbE SFP+ hot swappable uplink module
3	(1) fan tray	Provides proper ventilation
4	(2) mini-SAS stacking ports	Full-duplex high-availability stacking architecture that allows management of up to 12 switches from a single IP address
5	(1) power supply	Provides redundant power

CHAPTER 2: OVERVIEW

2.6.3 LED INDICATORS

The EMS1G24F 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 EMS1G24F switch LED behavior is seen during ONIE operations.

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

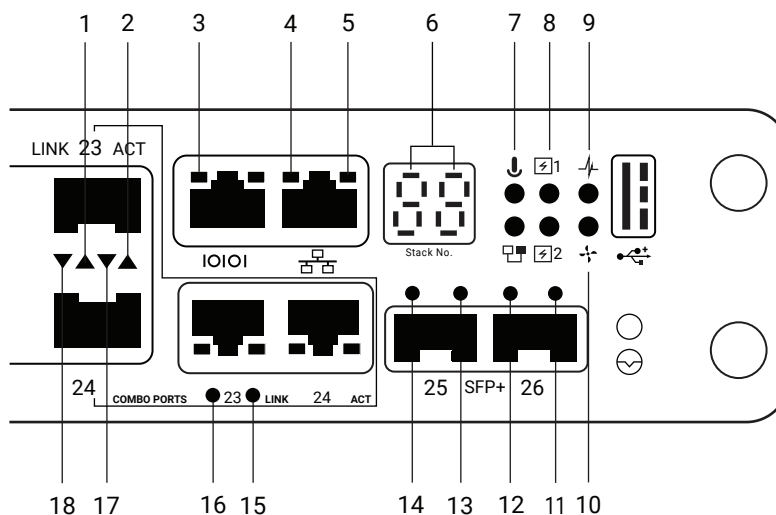


FIGURE 2-3. LEDS ON THE SWITCH

TABLE 2-4. LEDS ON THE SWITCH

NUMBER IN FIGURE 2-3	NAME OF LED	DESCRIPTION
1, 18	(2) Gigabit Ethernet (100BASE-FX/ 1000BASE-X) SFP port LNK LEDs	LNK (Link speed): • Off — No link • Solid green — Link on 1 Gbps speed • Solid yellow — Link on 100 Mbps speed
2, 17	(2) Gigabit Ethernet (100BASE-FX/ 1000BASE-X) SFP port ACT LEDs	ACT (Data transmission): • Blinking green — Activity • Off — No activity
3	(1) Console port LNK LED	LNK (Link speed): • Off — No link • Solid green — Link
4	(1) Management port LNK LED	LNK (Link speed): • Off — No link • Solid green — Link on 1 Gbps speed • Solid amber — Link on 100 Mbps or 10 Mbps speed
5	(1) Management port ACT LED	ACT (Data transmission): • Blinking green — Activity • Off — No activity

TABLE 2-4 (CONTINUED). LEDS ON THE SWITCH

NUMBER IN FIGURE 2-3	NAME OF LED	DESCRIPTION
6	(1) Stack number LCD	<ul style="list-style-type: none"> Displays the stack unit number of the switch. Displays 1 if switch is not part of a stack.
7	(1) Temperature LED	<ul style="list-style-type: none"> Solid green — The system temperature is below the threshold limit. Solid red — The system temperature has exceeded the threshold limit of 167° F (75° C).
8, 11	(2) LEDs: PSU 1 and 2	<ul style="list-style-type: none"> Off — Power failure or no power Solid green — Normal operation Blinking green — Locator function is enabled.
9	(1) System Status LED	<ul style="list-style-type: none"> Solid green — Normal operation. The CLI prompt is available. Blinking green — Boot up is in process. Solid red — Critical system error Blinking red — Non-critical system error (fan failure, power supply failure)
10	(1) Fan LED	<ul style="list-style-type: none"> Solid green — Fan is powered and running at the expected RPM. Solid red — Fan failed.
12	(1) Master (M) LED	<ul style="list-style-type: none"> Solid green — System is in Stacking Master mode. Off — Switch is in Slave mode.
13	(1) SFP+ (10G) port LNK LED	LNK (Link Speed): <ul style="list-style-type: none"> Off — No link Solid green — Link on 10G speed Solid amber — Link on 1G speed
14	(1) SFP+ (10G) port ACT LED	ACT (Data transmission): <ul style="list-style-type: none"> Off — No link Blinking green — Activity
15	(1) Combo SFP (1G) port LNK LED	LNK (Link Speed): <ul style="list-style-type: none"> Off — No link Solid green — Link on 1000 Mbps speed Solid amber — Link on 100 Mbps speed
16	(1) Combo SFP (1G) port ACT LED	ACT (Data transmission): <ul style="list-style-type: none"> Off — No link Blinking green — Activity

CHAPTER 3: PREPARING THE SITE

The EMS1G24F 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 EMS1G24F 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 EMS1G24F 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 temperature range i from 32 to 113° F (0 to 45° C).
- ♦ The switch operating ambient temperature range is from 50 to 95° F (10 to 35° F).
- ♦ Operating humidity is from 5 to 85 percent noncondensing.
- ♦ Storage humidity is from 5 to 95 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.
- ♦ Positioned in a rack or cabinet, or on a desktop with adequate space in the front, rear, and sides for proper ventilation and access.

3.2 CABINET PLACEMENT

Install the EMS1G24F only in indoor cabinets designed for use in a controlled environment.

Do not install the EMS1G24F 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 EMS1G24F 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

Installation of the fans is done as part of the factory install. The EMS1G24F supports the following configuration:

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

For proper ventilation, position the EMS1G24F in an equipment rack or cabinet with a minimum of 5 inches (12.7 cm) of clearance around the exhaust vents. When you install two EMS1G24F switches near each other, to permit proper airflow, position the two chassis at least 5 inches (12.7 cm) apart. The fan speed increases when the internal temperature reaches 161.6° F (72°C) and decreases to normal speed when the temperature falls to 136.4° F (58° C). The EMS1G24F 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 EMS1G24F. 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 EMS1G24F 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 +158° F (-40 to +70° 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: NEBS COMPLIANCE

For your switch to be network equipment building system (NEBS) compliant, you must follow the instructions detailed in this section.

To be NEBS compliant, orient your switch in the rack so that the air inlet is from the front aisle and the air exhaust is to the rear aisle.

Important information

WARNING: The form-factor pluggable plus (SFP+), 1000BASE-T, console, Ethernet management, and universal serial bus (USB) ports are suitable for connection to intrabuilding or unexposed wiring or cabling only. You must NOT metalically connect the ports to interfaces that connect to the outside plant (OSP) or its wiring. Use these interface as intrabuilding interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 6) and they require isolation from the exposed OSP cabling. Adding primary protectors is not sufficient protection to connect these interfaces metalically to OSP wiring.

WARNING: If you install and connect the EMS1G24F switch to a commercial AC power source, you must connect the switch to an external special protection device (SPD).

To be NEBS compliant, you must follow these regulations:

- ♦ Locate your switch in a restricted access area where only trained personnel are allowed access.
- ♦ Install and connect your switch to the common bonding network (CBN).
- ♦ You can also install and connect your switch to the central office.
- ♦ Connect the battery returns of your switch as DC-I.
- ♦ Ground your switch using a copper ground connector.
- ♦ Clean and coat all bare grounding connection points on your switch with antioxidant
- ♦ Clean and coat all bare grounding connection points on your switch with an antioxidant solution before making connections.
- ♦ Bring all unplated surfaces on your switch to a bright finish and treat them with an antioxidant solution before making connections.
- ♦ Remove any nonconductive surfaces on your switch from the threads and connection points to ensure electrical continuity.
- ♦ Use the two-hole, Listed, compression-type lug with an AWG 14 gauge wire that uses 4-in./lb. to secure your switch to the frame.

NOTE: The switch can operate at -40.5 VDC to -60 VDC at a maximum current level of 24 A.

NOTE: The switch is Earthquake Z4-compliant when you attach the rails to the frame using threaded hardware.



CHAPTER 5: INSTALLING THE SWITCH

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

5.1 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.

5.2 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 use the mounted rails as a shelf or a workplace.

5.2.1 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 5: INSTALLING THE SWITCH

5.2.2 RAILS SYSTEM INSTALLATION

The rackmounting system is provided to easily configure your rack for installation of your EMS1G24F 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.

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.

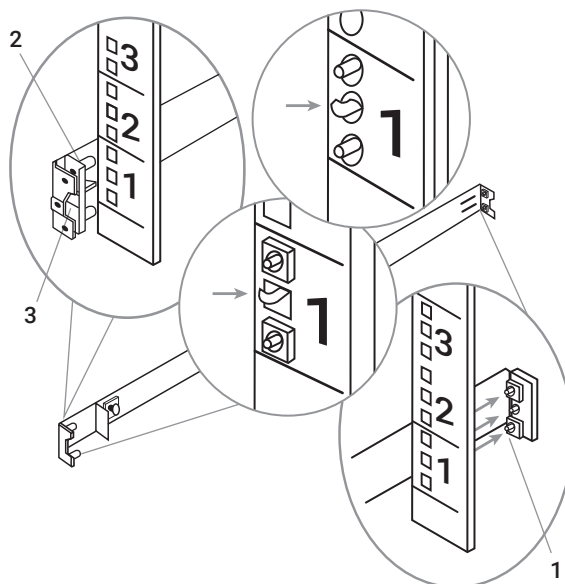


FIGURE 5-1. 1U TOOL-LESS CONFIGURATION

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 5: 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.

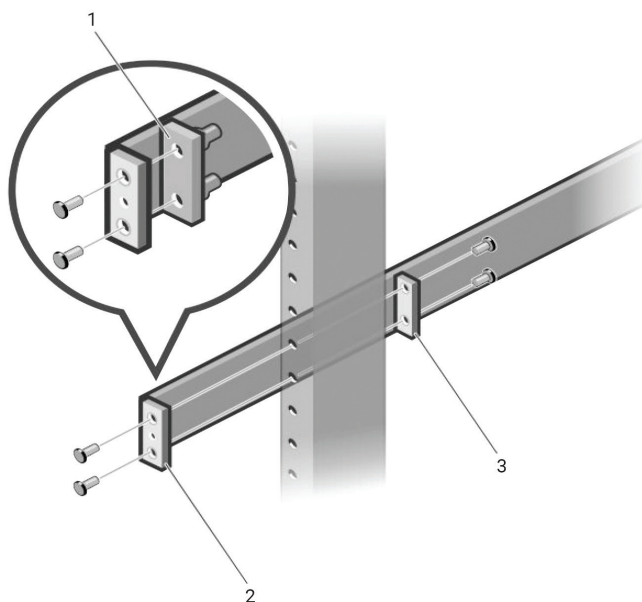


FIGURE 5-2. TWO-POST FLUSH-MOUNT CONFIGURATION

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 5: 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.

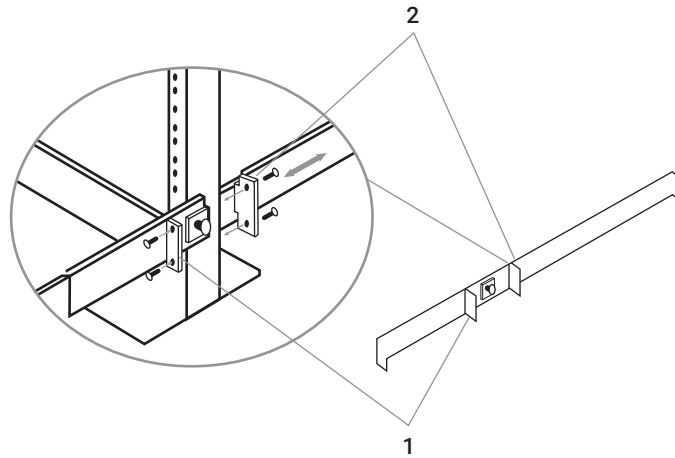


FIGURE 5-3. TWO-POST CENTER-MOUNT CONFIGURATION

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 5: 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.

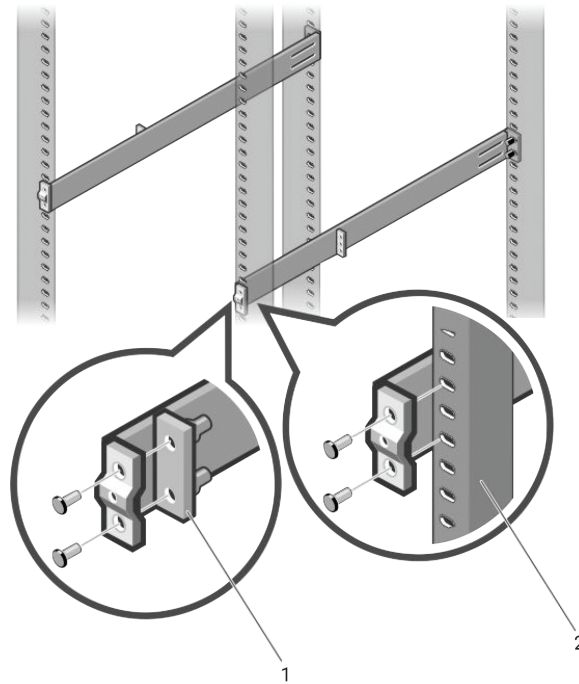


FIGURE 5-4. FOUR-POST THREADED CONFIGURATION

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 5: INSTALLING THE SWITCH

5.3 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 EMS1G24F switch. Item 3 shows the detail for the front standoff with the locking tab.

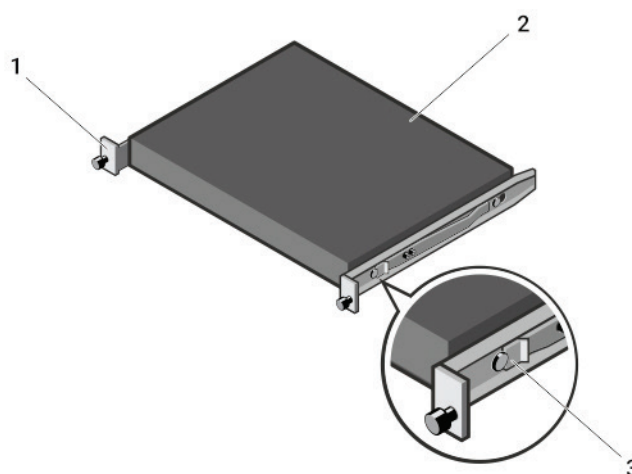


FIGURE 5-5. SWITCH RAILS ATTACHMENT

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 5: INSTALLING THE SWITCH

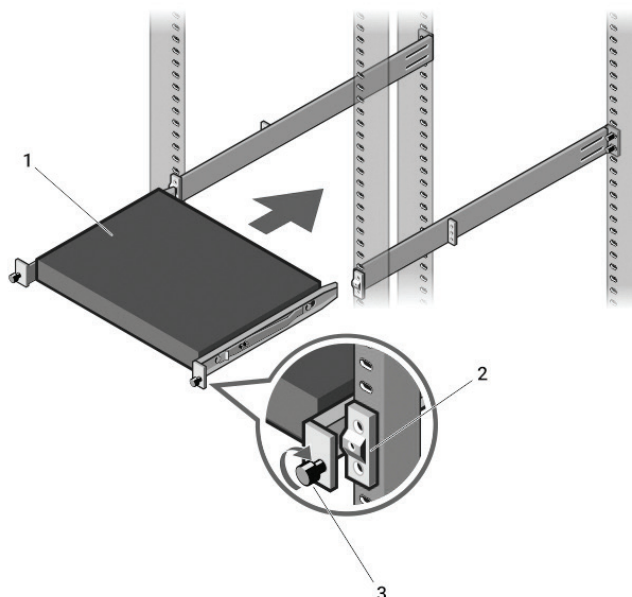


FIGURE 5-6. FRONT RACK INSTALLATION

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

5.4 CONNECTING THE STACKING PORTS (OPTIONAL)

You can connect up to 12 switches to operate as a single unit, using two fixed Mini Serial Attached SCSI (miniSAS) stacking connectors on the PSU side. When you connect multiple switches together through the stack ports, the stack operates and is managed as a single entity. You can combine different platforms within the switch series into one stack.

Black Box recommends installing the switches connected in a ring topology. Assemble and cable the stack of switches before powering up and configuring it.

To install your switches in a ring topology, follow these steps.

1. Connect one of the mini-SAS cables into either of the stacking ports of the top switch and the switch directly below it. As necessary, use a separately purchased, (1 meter or 3 meter long) mini-SAS cable to connect the switches.
2. Repeat this process until all the devices are connected.
3. Use the remaining stacking cable to connect the two remaining stacking ports together so that a ring topology is assembled.

A stack of three switches connected in a ring topology has these physical connections between the switches:

1. The bottom mini-SAS port on Unit 1 is connected to the top mini-SAS port on Unit 2.
2. The bottom mini-SAS port on Unit 2 is connected to the top mini-SAS port on Unit 3.
3. The bottom mini-SAS port on Unit 3 is connected to the top mini-SAS port on Unit 1.

After you power up a stack for the first time, the switches elect a master switch, which may occupy any location in the stack.

The Master LED on the front panel is illuminated on the master unit.

If a master failure is detected in the stack, the stacking feature supports a standby unit that assumes the master unit role. The standby unit is automatically selected in the stack. When a master failure is detected, the standby unit initializes the control plane and enables all other stack units with the current configuration. The standby unit maintains a synchronized copy of the running configuration for the stack.

CHAPTER 5: INSTALLING THE SWITCH

NOTE: You can (optionally) use the CLI to assign the master unit role, or select a different stack member as the standby unit, based on priority or MAC address.

5.5 GROUND CABLE

Black Box recommends that you ground your switch. To attach the ground cable to the chassis, use a single M4 x 0.7 screw. The cable itself is not included with the switch.

To properly ground the chassis, Black Box recommends using a 6 AWG one-hole lug, #10 hole size, 63" spacing, not included in shipping. The one-hole lug must be a UL recognized, crimp-type lug.

CAUTION: Grounding conductors must be made of copper. Do not use aluminum conductors.

NOTE: The rack installation ears are not suitable for grounding.

NOTE: Coat the one-hole lug with an antioxidant compound before crimping. Also, bring any unplated mating surfaces to a shiny finish and coat with an antioxidant before mating. Plated mating surfaces must be clean and free from contamination.

1. Cut the ground cable to the desired length.

The cable length must facilitate proper operation of the fault interrupt circuits. Black Box recommends using the shortest cable route allowable.

2. Take the one M4 x 0.7 screw from the package.

3. Attach the one-hole lug to the chassis using the supplied 10–32 screw with the captive internal tooth lock washer. Torque the screw to 20 in-lbs.

4. Attach the other end of the ground cable to a suitable ground point. The rack installation ears are not a suitable grounding point.



CHAPTER 5: INSTALLING THE SWITCH

5.6 OPTICS INSTALLATION

The EMS1G24F has (24) 1G SFP optical ports and (2) 10G SFP+ optical uplink ports. Compatible SFP+ modules are listed in Section 2.5.

CAUTION: ESD damage can occur if components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the EMS1G24F 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.

When hot swapping optional modules, the following module behaviors should be noted:

- ♦ The configuration of the port is retained when an existing module is replaced with one that is the same.
- ♦ Replacement of an optional module with one that is different results in the new module being moved into an error state.
- ♦ Modify the configuration of the optional module interfaces only when the module is installed.

CAUTION: Do not insert the replacement module immediately after removing the original module. When removing the optional module, the syslogs must first be removed prior to installing the replacement module.

After a module is recognized, its configuration is stored locally on the switch as the switch default. Users can modify the configuration of these interfaces only if the optional module is present. The module configuration appears in the running configuration for informational purposes.

5.7 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 tug repeatedly on the tab.

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

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.

CHAPTER 6: POWER SUPPLIES

The switch ships with one AC power supply. We recommend purchasing a second power supply.

- AC power supply with integrated fan

The EMS1G24F switch includes an AC power supply with airflow from the I/O side to the PSU side. Two PSUs are required for full redundancy, but the switch can operate with a single PSU.

CAUTION: Do not mix power supplies with different airflow directions in the same switch chassis.

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 EMS1G24F and its components.

6.1 COMPONENTS

The following power supply option is available for the EMS1G24F 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.

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.



CHAPTER 6: POWER SUPPLIES

6.2 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.

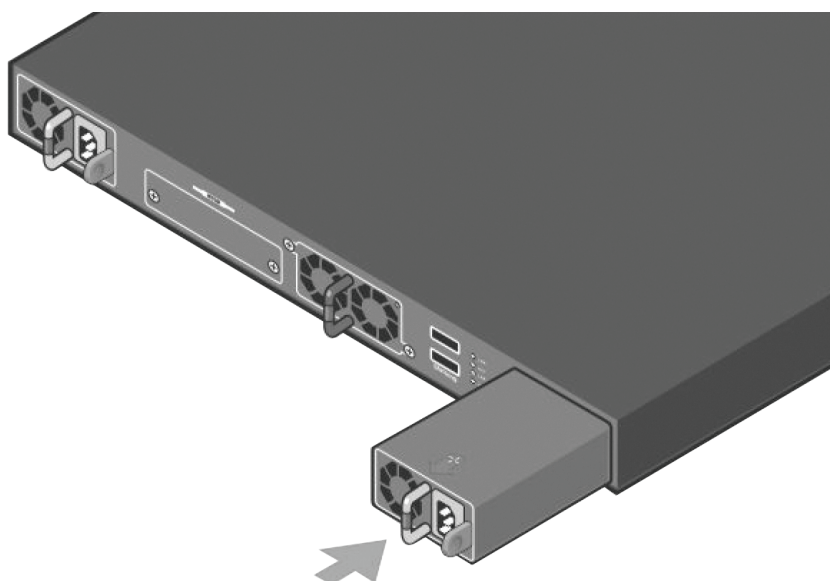


FIGURE 6-2. PSU INSTALLATION

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

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.

CHAPTER 6: POWER SUPPLIES

6.3 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

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 7: FANS

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

NOTE: To run the switch, all slots must have operating fan units. If you do not install a module in each slot either as part of the PSU or as an independent fan module, the switch shuts down in one minute.

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

The switch supports two airflow direction options. Do not mix airflow types in a chassis; you can use only a single airflow direction in a chassis. If the airflow directions are mismatched, the switch issues an alarm. You must correct the mismatched airflow direction.

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

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.

7.1 COMPONENTS

The following are the EMS1G24F fan components.

- EMS1G24F Fan module

7.2 FAN MODULE INSTALLATION

The fan modules in the switch are field replaceable.

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

CAUTION: DO NOT mix airflow directions. All fans must use the same airflow direction—reverse or normal. If you mix the airflow direction, the switch detects the discrepancy and issues an alarm. You must correct the mixed airflow direction.

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

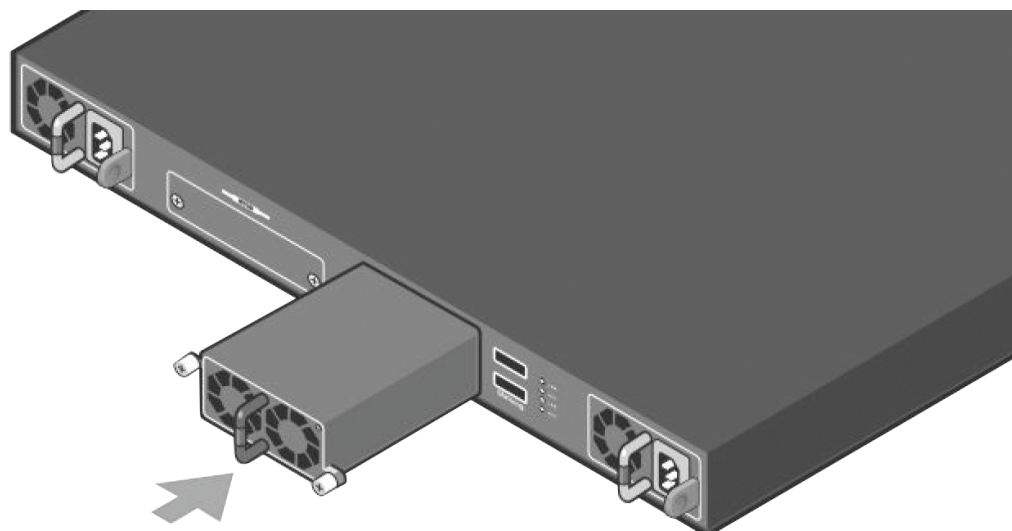


FIGURE 7-1. FAN MODULE INSTALLATION

7.3 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.

7.4 AFTER INSTALLING THE SWITCH

After you have securely installed and powered on the switch, to configure your switch, see your ONIE-compatible operating system documentation.

CHAPTER 8: INSTALLING THE SOFTWARE

This section describes the initial software configuration, including connecting, booting, configuration, and examples.

8.1 NAVIGATING CLI MODES

The Networking OS prompt changes to indicate the CLI mode. You can move linearly through the command modes, except for the end command that takes you directly to EXEC Privilege mode, and the exit command that moves you up one command mode level.

8.2 ACCESSING THE CONSOLE

The console port is on the I/O side of the chassis (item 1 in the following figure).

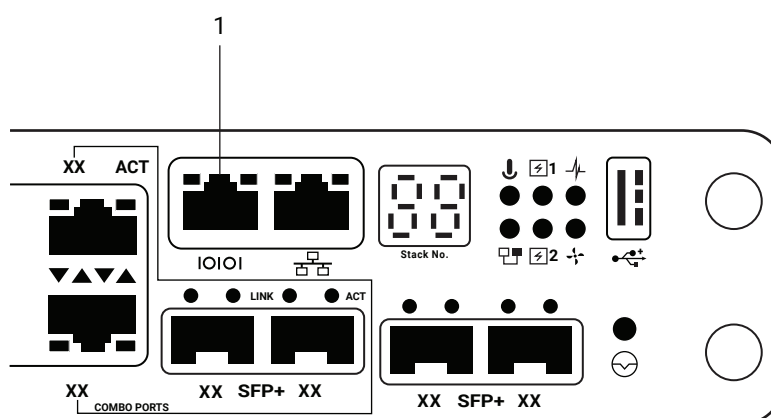


FIGURE 8-1. SWITCH RS-232 CONSOLE PORT

NOTE: You must have a password configured on a virtual terminal line before you can Telnet into the system. Therefore, use a console connection when connecting to the system for the first time. Before starting this procedure, be sure that you have a terminal emulation program already installed on your PC.

NOTE: If you are configuring a stack of switches, serial console access to the stack manager is available from any serial port using the local CLI. Only one serial console session at a time is supported.

1. Install an RJ-45 copper cable into the console port. Use a rollover cable to connect the console port to a terminal server.
2. Connect the other end of the cable to the DTE terminal server.
3. Set the default terminal settings as follows.
 - ♦ 9600 baud rate
 - ♦ No parity
 - ♦ Eight data bits
 - ♦ One stop bit
 - ♦ No flow control

CHAPTER 8: INSTALLING THE SOFTWARE

8.3 ACCESSING THE RJ-45 CONSOLE PORT WITH A DB9 ADAPTER

If the DTE has a DB9 interface, you can connect to the console using an RJ-45 to DB9 adapter along with the RJ-45 rollover cable.

TABLE 8-1. PIN ASSIGNMENTS BETWEEN THE CONSOLE AND A DTE TERMINAL SERVER

CONSOLE PORT	RJ-45 TO RJ-45 ROLLOVER CABLE	RJ-45 TO RJ-45 ROLLOVER CABLE	RJ-45 TO DB9 ADAPTER	TERMINAL SERVER DEVICE
SIGNAL	RJ-45 PINOUT	RJ-45 PINOUT	DB9 PIN	SIGNAL
RTS	1	8	8	CTS
NC	2	7	6	DSR
TxD	3	6	2	RxD
GND	4	5	5	GND
GND	5	4	5	GND
RxD	6	3	3	TxD
NC	7	2	4	DTR
CTS	8	1	7	RTS

8.4 DEFAULT CONFIGURATION

A version of the Networking OS is pre-loaded on the system; however, the system is not configured when you power up for the first time.

You must configure the system using the CLI.

8.5 CONFIGURING LAYER 2 (DATA LINK) MODE

To enable Layer 2 data transmissions through an individual interface, use the `switchport` command in `INTERFACE` mode.

You cannot configure switching or Layer 2 protocols such as spanning tree protocol (STP) on an interface unless the interface has been set to Layer 2 mode.

1. Enable the interface.

```
INTERFACE mode
no shutdown
```

2. Place the interface in Layer 2 (switching) mode.

```
INTERFACE mode
switchport
```

To view the interfaces in Layer 2 mode, use the `show interfaces switchport` command in `EXEC` mode.



CHAPTER 8: INSTALLING THE SOFTWARE

8.6 CONFIGURING A HOST NAME

The host name appears in the prompt.

Host names must start with a letter, end with a letter or digit, and must have characters, letters, digits, and hyphens in the string.

- Create a new host name.

CONFIGURATION mode

```
hostname name
```

8.7 ACCESSING THE SYSTEM REMOTELY

You can configure the system to be accessed remotely by Telnet.

The system has a dedicated management port and a management routing table that is separate from the IP routing table.

1. Configure an IP address for the management port (Configuring the Management Port IP Address).
2. Configure a management route with a default gateway (Configuring the Management Route).
3. Configure a username and password (Configuring the Username and Password).

8.8 CONFIGURING THE MANAGEMENT PORT IP ADDRESS

To access the system remotely, assign IP addresses to the management ports.

1. Enter INTERFACE mode for the management port.

CONFIGURATION mode

```
interface ManagementEthernet slot/port
```

2. Assign an IP address to the interface.

INTERFACE mode

```
ip address ip-address/mask
```

3. Enable the interface.

INTERFACE mode

```
no shutdown
```

8.9 CONFIGURING THE MANAGEMENT ROUTE

Define a path from the switch to the network from which you will remotely access the system.

Management routes are separate from IP routes; they manage the system through the management port.

- Configure a management route to the network from which you will access the system.

CONFIGURATION mode

```
management route ip-address/mask gateway
```



CHAPTER 8: INSTALLING THE SOFTWARE

8.10 CONFIGURING THE USERNAME AND PASSWORD

To access the system remotely, configure a system username and password.

- Configure a username and password to access the system remotely.

CONFIGURATION mode

```
username username password [encryption-type]
```

8.11 CONFIGURING THE ENABLE PASSWORD

Access EXEC Privilege mode using the enable command. EXEC Privilege mode is unrestricted by default.

As a basic security measure, configure a password. There are two types of enable passwords:

- enable password — stores the password in the running/startup configuration using a data encryption standard (DES)-encryption method.
- enable secret — stores the password in the running/startup configuration using a stronger, MD5-encryption method.

Black Box recommends using the enable secret password.

- Create a password to access EXEC Privilege mode.

CONFIGURATION mode

Installing the Software 21

```
enable [password | secret] [level level] [encryption-type] password
```

8.12 CREATING A PORT-BASED VLAN

The default local area network (VLAN), VLAN 1, is part of the system startup configuration and does not require configuration.

To configure a port-based VLAN, create the VLAN and then add physical interfaces or port channel (LAG) interfaces to the VLAN.

- Configure a port-based VLAN (if the vlan-id is different from the default VLAN ID) and enter INTERFACE VLAN mode.

CONFIGURATION mode

```
interface vlan vlan-id
```

After you create a VLAN, assign interfaces in Layer 2 mode to the VLAN to activate the VLAN.

To view the configured VLANs, use the `show vlan` command in EXEC Privilege mode.

8.13 ASSIGNING INTERFACES TO A VLAN

You can only assign interfaces in Layer 2 mode to a VLAN using the `tagged` and `untagged` commands.

To place an interface in Layer 2 mode, use the `switchport` command.

You can designate Layer 2 interfaces as tagged or untagged. When you place an interface in Layer 2 mode using the `switchport` command, the interface automatically designates untagged and is in the default VLAN.

To tag frames leaving an interface in Layer 2 mode, assign that interface as tagged to a port-based VLAN to tag it with that VLAN ID.

To move untagged interfaces from the default VLAN to another VLAN, use the `untagged` command.



CHAPTER 8: INSTALLING THE SOFTWARE

1. Tag interfaces. Access INTERFACE VLAN mode of the VLAN to which you want to assign the interface.

CONFIGURATION mode

```
interface vlan vlan-id
```

2. Enable an interface to include the IEEE 802.1Q tag header.

INTERFACE mode

```
tagged interface
```

This command is available only in VLAN interfaces.

3. Move untagged interfaces. Access INTERFACE VLAN mode of the VLAN to which you want to assign the interface.

CONFIGURATION mode

```
interface vlan vlan-id
```

4. Configure an interface as untagged.

INTERFACE mode

```
untagged interface
```

This command is available only in VLAN interfaces.

To view which interfaces are tagged or untagged and to view which VLAN the interfaces belong, use the `show vlan` command.

To view just the interfaces that are in Layer 2 mode, use the `show interfaces switchport` command in EXEC Privilege mode or EXEC mode.

8.14 ASSIGNING AN IP ADDRESS TO A VLAN

VLANs are a Layer 2 feature. For two physical interfaces on different VLANs to communicate, assign an IP address to the VLANs to route traffic between the two interfaces.

The `shutdown` command in INTERFACE mode does not affect Layer 2 traffic on the interface.

NOTE: You cannot assign an IP address to the default VLAN, which, by default, is VLAN 1. To assign another VLAN ID to the default VLAN, use the `default vlan-id vlan-id` command from the configuration mode.

- Access INTERFACE VLAN mode of the VLAN to which you want to assign the IP address.

INTERFACE mode

```
ip address ip-address mask [secondary]
```

Configure an IP address and mask on the interface.

8.15 CONNECTING THE SYSTEM TO THE NETWORK

After you have completed the hardware installation and software configuration for the system, connect to your company network by following your company's cabling requirements.

CHAPTER 9: TROUBLESHOOTING

9.1 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.

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.

9.2 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 de 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 bloquear 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 debe 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 equipo 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

<p>A급 기기 (업무용 방송통신기자재)</p>	<p>이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.</p>
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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

Black Box and the Black Box logo type and mark are registered trademarks of Black Box Corporation.

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



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NEED HELP?
LEAVE THE TECH TO US

LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

Lined area for notes.

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NEED HELP?
LEAVE THE TECH TO US

LIVE 24/7
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