

Connecting the Cisco SM-X Layer 2/3 EtherSwitch Service Module to the Cisco 4451-X ISR Network

April 2, 2014
OL-31267-01

This guide describes how to install the Cisco SM-X Layer 2/3 EtherSwitch Service Module (Cisco SM-X Layer 2/3 ESM) on the Cisco 4451-X Integrated Services Router (ISR) and how to connect the ESMs to your network.

Contents

This guide contains the following sections:

- [About the Cisco SM-X Layer 2/3 EtherSwitch Service Module, page 2](#)
- [Preparing for Installation, page 8](#)
- [Power Specifications for the Cisco SM-X Layer 2/3 ESMs, page 14](#)
- [Connecting to the Cisco SM-X Layer 2/3 ESM Ports, page 16](#)
- [Related Documents, page 16](#)



About the Cisco SM-X Layer 2/3 EtherSwitch Service Module

This section describes the Cisco SM-X Layer 2/3 ESM. It contains the following sections:

- [Cisco SM-X Layer 2/3 ESM Overview, page 2](#)
- [Cisco SM-X Layer 2/3 ESM Ports, page 3](#)
- [Cisco SM-X Layer 2/3 ESM LEDs, page 7](#)

Cisco SM-X Layer 2/3 ESM Overview

The Cisco SM-X Layer 2/3 EtherSwitch Service Modules (ESMs) are switch modules to which you can connect Cisco IP phones, Cisco wireless access point workstations, and other network devices such as servers, routers, switches, and other network switch modules.

Cisco SM-X Layer 2/3 EtherSwitch Service Modules are supported on the Cisco 4451-X ISR.

Each router can support the maximum number of mixed service modules introduced in supported Cisco IOS XE releases. The service modules in Cisco IOS Release 15.3(3)M will have multiple SKUs with three different port densities:

- 16-port 10/100/1000 RJ45 L3 SKU
- 24-port 10/100/1000 RJ45 L3 SKU
- 48-port 10/100/1000 RJ45 plus 2 100/1000 SFP L3 SKU

These modules support 125 MHz, 2 Gb with error correcting code (ECC) of system double data rate (DDR2) running at 250 Mbps data rate and uses a 64 Mb Numonyx boot flash.

The maximum number of Cisco SM-X Layer 2/3 ESM units that can be present on the Cisco 4451-X ISR is dictated by the total service module slots present in the router. [Table 1-1](#) lists the maximum number of service modules supported on the router,

Table 1-1 Number of Modules Supported on Cisco ISR 4451-X

SKU	4451-X	Comments
SM-X-ES3-16-P	2	Maximum count of 16-port SKU when no other ESMs are present on the system.
SM-X-ES3-24-P	2	Maximum count of 24-port SKU when no other ESMs are present on the system.
SM-X-ES3D-48-P	2	Maximum count of 48-port SKU when no other ESMs are present on the system.

For information about these and other features available in Cisco SM-X Layer 2/3 ESMs, see the *Cisco SM-X Layer 2/3 EtherSwitch Service Module Configuration Guide* at the following URL:

http://www.cisco.com/en/US/docs/routers/access/interfaces/software/feature/guide/eesm_sw.html

The following modules are available with this release of the hardware:

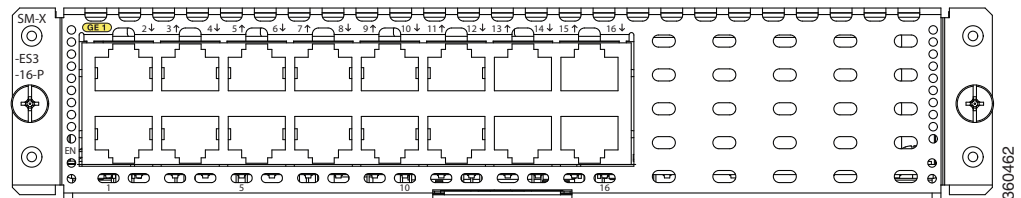
- SM-X-ES3-16-P—16-port 10/100/1000 Gigabit Ethernet, PoE+, MACSec enabled Service Module single-wide form factor
- SM-X-ES3-24-P—24-port 10/100/1000 Gigabit Ethernet, PoE+, MACSec enabled Service Module, single-wide form factor.

- SM-X-ES3D-48-P—48-port, 10/100/1000 Gigabit Ethernet, 2 SFP Ports, PoE+, MACSec enabled Service Module, double-wide form factor.

16-Port Cisco SM-X Layer 2/3 EtherSwitch Service Module

Figure 1 shows the 16-port Cisco SM-X Layer 2/3 EtherSwitch Service Module.

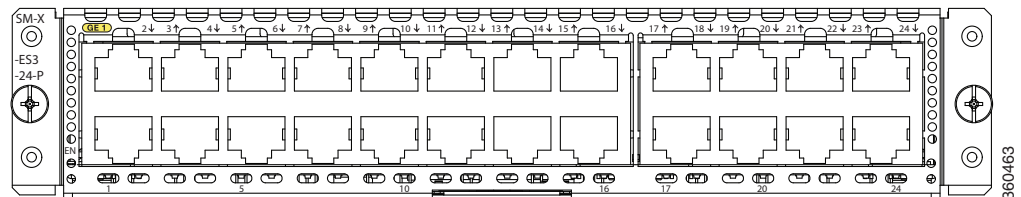
Figure 1 SM-X-ES3-16-P Cisco SM-X Layer 2/3 ESM



24-Port Cisco SM-X Layer 2/3 EtherSwitch Service Module

Figure 2, shows the 24-port Cisco SM-X Layer 2/3 EtherSwitch Service Module.

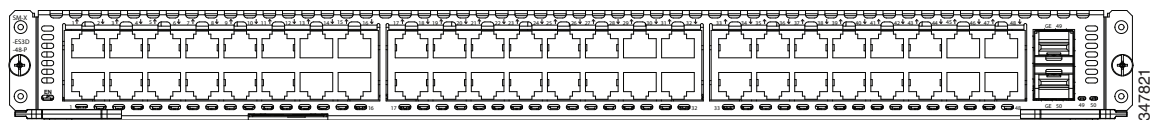
Figure 2 SM-X-ES3-24 Cisco SM-X Layer 2/3 ESM



48-Port Cisco SM-X Layer 2/3 EtherSwitch Service Module

Figure 3, show the 48-port Cisco SM-X Layer 2/3 EtherSwitch Service Module

Figure 3 SM-X-ES3D-48 Cisco SM-X Layer 2/3 ESM



Cisco SM-X Layer 2/3 ESM Ports

The following sections describe the port numbering and port types on the service modules:

- [Port Numbering](#), page 4
- [Port Types](#), page 5

Port Numbering

The Ethernet ports are numbered left to right, top to bottom. The port numbering scheme to configure the ports on the Cisco SM-X Layer 2/3 ESM includes the port type (such as **gi** or **gigabitethernet** for Gigabit Ethernet), the module slot number (always 0), and the switch port number.

For example, to configure Gigabit Ethernet port 3 in slot 0, the interface configuration command would be:

```
Switch (config)# interface gi 0/3
```

Port Types

The following sections describe the port types on the service modules:

- [10/100/1000 RJ45 Ports](#)
- [SFP Modules](#)

All Cisco SM-X Layer 2/3 ESMs, use RJ-45 connectors to provide Gigabit Ethernet (GE) connections.

**Note**

Cisco SM-X Layer 2/3 EtherSwitch Service Modules do not have a physical console interface, but they are accessible for software configuration and other operational procedures through console sessions between the Cisco SM-X Layer 2/3 ESM and the host router.

10/100/1000 RJ45 Ports

You can set the 10/100/1000 RJ45 ports for speed and duplex autonegotiation in compliance with IEEE 802.3ab. (The default setting is autonegotiate.)

When set for autonegotiation, the port senses the speed and duplex settings of the attached device and advertises its own capabilities. If the connected device also supports autonegotiation, the Cisco SM-X Layer 2/3 ESM port negotiates the best connection (that is, the fastest line speed that both devices support and full-duplex transmission if the attached device supports it) and configures itself accordingly. In all cases, the attached device must be within 100 meters (328 feet).

All 10/100/1000 RJ45 ports on the Cisco SM-X Layer 2/3 ESM can provide power to IEEE 802.3af-compliant and non-compliant PoE devices. Power over Ethernet (PoE) devices are Cisco IP phones, Cisco access points, and some Cisco switches. PoE, formerly referred to as inline power, is available in all service module form factors supported by Cisco modular access routers.

[Table 2](#) provides information on Cisco SM-X Layer 2/3 ESM port speed and duplex mode.

Table 2 Port Speed and Duplex

Port Function	Explanation
Speed	<p>The operating speed of the switch port. You can choose Auto (autonegotiation) if the connected device can negotiate the link speed with the switch port.</p> <p>The default settings are:</p> <ul style="list-style-type: none"> • Auto for the external 10/100-Mbps Fast Ethernet ports • Auto for the external Gigabit Ethernet RJ-45 (10/100/1000-Mbps) ports • 1000 Mbps for the SFP module ports
Duplex	<p>The duplex mode of the switch port. Choose from one of the following:</p> <ul style="list-style-type: none"> • Auto (autonegotiation) if the connected device can negotiate with the switch • Full (full duplex) if both devices can send data at the same time • Half (half duplex) if one or both devices cannot send data at the same time <p>The default settings are:</p> <ul style="list-style-type: none"> • Auto for the external 10/100-Mbps Fast Ethernet ports • Auto for the external Gigabit Ethernet RJ-45 (10/100/1000-Mbps) ports • Full for the 1000-Mbps ports (SFP) <p>Note You cannot set the port to Half duplex if the port speed is set to Auto.</p>

SFP Modules

The Cisco SM-X Layer 2/3 ESM supports Gigabit Ethernet SFP modules for fiber-optic connections. These laser optical transceiver modules are field-replaceable, and you can insert them into an SFP module slot. You can use fiber-optic cables with local connectors (LC) to connect to an SFP module. You can use the SFP modules for gigabit uplink connections to other devices.

The SFP modules support 850- to 1550-nm nominal wavelengths.

You can install the following SFP module types in the Cisco SM-X Layer 2/3 ESMs with SFP module slots:

- GLC-LH-SM
- GLC-S-MM
- GLC-ZX-SM
- GLC-BX-D
- GLC-BX-U
- GLC-T
- GLC-GE-100FX



Note Only the 48-port Cisco SM-X Layer 2/3 ESMs support SFP.

Cisco SM-X Layer 2/3 ESM LEDs

Cisco SM-X Layer 2/3 ESM LEDs provide green, amber, and off states for system and port status. The following sections describe LEDs on the service modules:

- [EN LED](#)
- [Port LEDs](#)



Note

Port LEDs on nonstacking Cisco SM-X Layer 2/3 ESMs only show link status.

EN LED

All Cisco SM-X Layer 2/3 ESMs have an enable (EN) LED. This LED indicates that the module has passed its self-test and is available to the router. (See [Figure 4.](#)) [Table 3](#) lists the EN LED colors and their meanings.

Figure 4 EN LED

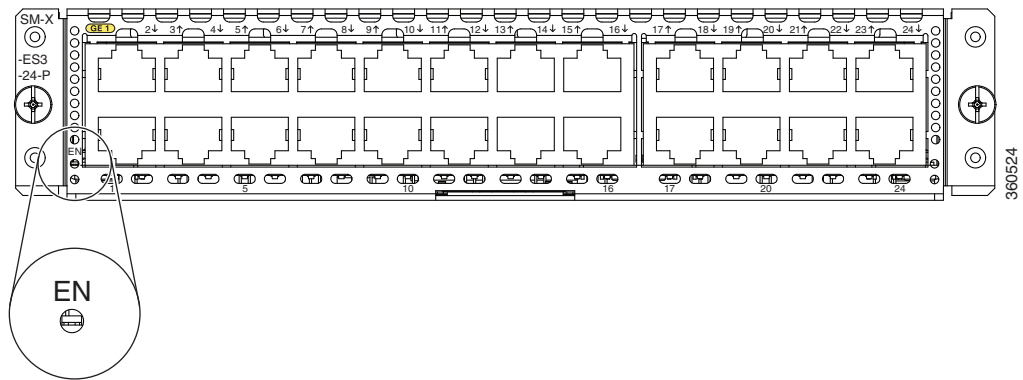


Table 3 EN LED

State	System Status
Off	The Cisco SM-X Layer 2/3 EtherSwitch Service Module is not yet operational.
Green	The Cisco SM-X Layer 2/3 EtherSwitch Service Module is operational.
Amber	An error has occurred.

Port LEDs

Each port has a port LED. These port LEDs, as a group or individually, display information about the module and about the individual ports. [Table 4](#) explains how to interpret the port LED colors for link status on the Cisco SM-X Layer 2/3 ESMs.

Table 4 *Port LED on the Cisco SM-X Layer 2/3 ESMs*

Port LED Color	Description
Off	No link is detected, or the port was administratively shut down. On PoE ports, no inline powered device (PD) is detected, or the port is not connected.
Green	A link is present. The port or system is functioning normally. On PoE ports, the Cisco SM-X Layer 2/3 ESM is providing power to a PD.
Flashing green	Activity is occurring. The port is transmitting or receiving data, or the module POST is in progress.
Alternating green/amber	A link fault is detected. On PoE ports, the Cisco SM-X Layer 2/3 ESM is denying power to a PD, or is experiencing a power delivery fault.
Amber	The port is blocked by the Spanning-Tree Protocol (STP) and is not forwarding data. Note After a port is reconfigured, the port LED can remain amber for up to 30 seconds. On a PoE port, the port is denied power or the port is administratively disabled. The system is receiving power but is not functioning properly.
Flashing amber	The port is blocked by STP and is transmitting or receiving packets. On a PoE port, an inline power delivery fault is detected.

Preparing for Installation

The following sections describe safety warnings, general maintenance guidelines, and safety recommendations that you must read before installing and using the ESM:

- [Safety Warnings, page 9](#)
- [Preventing Electrostatic Discharge Damage, page 10](#)
- [General Maintenance Guidelines and Safety Recommendations for Cisco SM-X Layer 2/3 ESMs, page 11](#)

Safety Warnings



Warning

Read the installation instructions before connecting the system to the power source. Statement 1004



Warning

Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030



Warning

This equipment must be installed and maintained by service personnel as defined by AS/NZS 3260. Incorrectly connecting this equipment to a general-purpose outlet could be hazardous. The telecommunications lines must be disconnected 1) before unplugging the main power connector or 2) while the housing is open, or both. Statement 1043



Warning

Before working on a system that has an on/off switch, turn OFF the power and unplug the power cord. Statement 1



Warning

This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028



Warning

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024



Warning

Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first. Statement 1026



Warning

Before opening the unit, disconnect the telephone-network cables to avoid contact with telephone-network voltages. Statement 1041



Warning

Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. Statement 43



Warning

Do not use this product near water; for example, near a bath tub, wash bowl, kitchen sink or laundry tub, in a wet basement, or near a swimming pool. Statement 1035

**Warning**

Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations. Statement 1036

**Warning**

Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface. Statement 1037

**Warning**

Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning. Statement 1038

**Warning**

To report a gas leak, do not use a telephone in the vicinity of the leak. Statement 1039

**Warning**

There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Statement 1015

**Warning**

Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place. Statement 1029

**Warning**

No user-serviceable parts inside. Do not open. Statement 1073

**Warning**

For connections outside the building where the equipment is installed, the following ports must be connected through an approved network termination unit with integral circuit protection.

port #1~16 for SM-X-ES3-16-P, port #1~24 for SM-X-ES3-24-P, and port #1~48 for SM-X-ES3D-48-P
Statement 1044

Preventing Electrostatic Discharge Damage

Electrostatic discharge can damage equipment and electrical circuitry. Electrostatic discharge occurs when electronic printed circuit cards, such as those used in Cisco service modules are improperly handled and can result in complete or intermittent equipment failure. Always observe the following procedures to prevent electrostatic discharge damage (ESD) when installing, removing, and replacing any electronic printed circuit cards:

- Make sure that the router chassis is electrically connected to earth ground.

- Wear an ESD-preventive wrist strap, and make sure that it makes good contact with your skin.
- Connect the wrist strap clip to an unpainted portion of the chassis frame to channel unwanted ESD voltages to ground.
- The wrist strap and clip must be used correctly to ensure proper ESD protection. Periodically confirm that the resistance value of the ESD-preventive wrist strap is between 1 and 10 megohms (Mohm).
- If no wrist strap is available, ground yourself by touching the metal part of the router chassis.

General Maintenance Guidelines and Safety Recommendations for Cisco SM-X Layer 2/3 ESMs

- [General Maintenance Guidelines, page 11](#)
- [Safety Recommendations, page 11](#)

General Maintenance Guidelines

- Keep the router chassis area clear and dust-free during and after installation.
- If you remove the chassis cover for any reason, store it in a safe place.
- Do not perform any action that creates a hazard to people or makes equipment unsafe.
- Keep walk areas clear to prevent falls or damage to equipment.
- Follow installation and maintenance procedures as documented by Cisco Systems, Inc.
- Always wear an electrostatic discharge (ESD)-preventive wrist strap and ensure that it makes good contact with your skin when you remove or install an EtherSwitch Service Module (ESM). Connect the equipment end of the wrist strap to the metal part of the chassis.
- Handle the ESMs by the edges only. ESMs are ESD-sensitive components and can be damaged by mishandling.

Safety Recommendations

To prevent hazardous conditions, follow these safety recommendations while working with this equipment:

- Keep tools away from walk areas where you or others could fall over them.
- Do not wear loose clothing around the router. Fasten your tie or scarf and roll up your sleeves to prevent clothing from being caught in the chassis.
- Wear safety glasses when working under any conditions that might be hazardous to your eyes.
- Locate the emergency power-off switch in the room before you start working. If an electrical accident occurs, shut the power off.
- Before working on the router, turn off the power and unplug the power cord.
- Disconnect all power sources before doing the following:
 - Installing or removing a router chassis
 - Working near power supplies
- Do not work alone if potentially hazardous conditions exist.

- Always check that power is disconnected from a circuit.
- Remove possible hazards from your work area, such as damp floors, ungrounded power extension cables, or missing safety grounds.
- If an electrical accident occurs, proceed as follows:
 - Use caution; do not become a victim yourself.
 - Turn off power to the room using the emergency power-off switch.
 - Determine the condition of the victim and send another person to get medical aid or call for help.
 - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

Installing and Removing the Cisco SM-X Layer 2/3 ESM in a Cisco 4451-X ISR

This section describes the following tasks for the Cisco SM-X Layer 2/3 ESM:

- [Software Requirements for the Cisco SM-X Layer 2/3 ESM, page 12](#)
- [Installing the Cisco SM-X Layer 2/3 ESM in a Cisco 4451-X ISR, page 13](#)
- [Removing the Cisco SM-X Layer 2/3 ESM from a Cisco 4451-X ISR, page 13](#)
- [Verifying Cisco SM-X Layer 2/3 ESM Installation on a Cisco 4451-X ISR, page 13](#)



Caution

Always wear an electrostatic discharge (ESD)-preventive wrist strap and ensure that it makes good contact with your skin when you install or remove a Cisco SM-X Layer 2/3 ESM. Connect the equipment end of the wrist strap to the metal part of the chassis.



Caution

Handle your ESMs by the edges only. ESMs are ESD-sensitive components and can be damaged by mishandling.

Software Requirements for the Cisco SM-X Layer 2/3 ESM

Cisco IOS XE Release 3.10S and Cisco IOS 15.3(3)S or a later release is required to install the Cisco SM-X Layer 2/3 ESM.

To determine the version of Cisco IOS software that is running on your router, log in to the router and enter the **show version** command:

```
Router> show version
Cisco IOS XE Software, Version BLD_V153_3_S_XE310_THROTTLE_LATEST_20130523_224617
Cisco IOS Software, ISR4400 Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Version
15.3(20130524:002151)
[v153_3_s_xe310_throttle-BLD-BLD_V153_3_S_XE310_THROTTLE_LATEST_20130523_224617-ios 190]
Copyright (c) 1986-2013 by Cisco Systems, Inc.
Compiled Thu 23-May-13 21:36 by ciscouser
```

Removing the Cisco SM-X Layer 2/3 ESM from a Cisco 4451-X ISR

Use the following procedure to remove the Cisco SM-X Layer 2/3 ESM from your router:

-
- Step 1** Read the “[Safety Warnings](#)” section on page 9 before you perform any module replacement.
 - Step 2** Locate the Cisco SM-X Layer 2/3 ESM to be removed.
 - Step 3** Using a number 1 Phillips or flat-blade screwdriver, unscrew the captive mounting screws on the module faceplate.
 - Step 4** Pull the Cisco SM-X Layer 2/3 ESM out of the chassis.
 - Step 5** Place the ESM in an antistatic bag to protect it from electrostatic discharge (ESD) damage.
-

Installing the Cisco SM-X Layer 2/3 ESM in a Cisco 4451-X ISR

Use the following procedure to install the Cisco SM-X Layer 2/3 ESM on your router:

-
- Step 1** Read the “[Safety Warnings](#)” section on page 9 before you perform any module replacement.
 - Step 2** Remove the blank faceplates installed over the slot you intend to use.
 - Step 3** Push the Cisco SM-X Layer 2/3 ESM into place until you feel the edge connector seat securely into the connector on the router backplane. The module faceplate should contact the chassis rear panel.
 - Step 4** Using a number 1 Phillips or flat-blade screwdriver, tighten the captive mounting screws on the module faceplate.
-

Verifying Cisco Cisco SM-X Layer 2/3 ESM Installation on a Cisco 4451-X ISR

Use the **show diag** command to verify that the Cisco SM-X Layer 2/3 ESM has been installed correctly. The following example displays one ESM installed and recognized by the system.

```

Router# show diag subslot 2/0 eeprom detail
SPA EEPROM data for subslot 2/0:

EEPROM version           : 4
Compatible Type          : 0xFF
Controller Type          : 1909
Hardware Revision        : 1.0
PCB Part Number          : 73-14154-02
Top Assy. Part Number    : 800-36532-01
Board Revision           : 06
Deviation Number         : 123598
Fab Version              : 02
PCB Serial Number        : FOC15495HU1
Asset ID                 : REV 2F
Product Identifier (PID) : SM-X-ESM3
Version Identifier (VID) : V01
CLEI Code                : TBD
Base MAC Address         : C4 0A CB 56 00 99
MAC Address block size   : 3
Manufacturing Test Data  : 00 00 00 00 00 00 00 00
Environment Monitor Data : 40 0B E3 43 00 0A
Platform features        : 02 01 01 0A 00 00 00 00
                        : 01 01 00

```

Power Specifications for the Cisco SM-X Layer 2/3 ESMs

The Cisco SM-X Layer 2/3 ESMs supports inline power on IP phones with –48 V power. This allows IP phones to be plugged into a standard RJ-45 jack and be powered from the switch rather than from an AC wall outlet.

The Cisco SM-X Layer 2/3 ESM distributes the –48 V power to each of the Ethernet ports that are configured for PoE. Each port can be independently configured for PoE.

The following limitations and specifications apply to the 12 V and -48 V power supplied to the ESM:

- [ESM 12-Volt Power Requirements, page 14](#)
- [PoE 48-Volt Power Restrictions, page 15](#)



Warning

Voltages that present a shock hazard may exist on Power over Ethernet (PoE) circuits if interconnections are made using uninsulated exposed metal contacts, conductors, or terminals. Avoid using such interconnection methods, unless the exposed metal parts are located within a restricted access location and users and service people who are authorized within the restricted access location are made aware of the hazard. A restricted access area can be accessed only through the use of a special tool, lock and key or other means of security. Statement 1072

ESM 12-Volt Power Requirements

[Table 1-5](#) lists the maximum power dissipation and consumption for the use of the 12 V power on the Cisco SM-X Layer 2/3 ESM.

Table 1-5 *Maximum Power Dissipation and Consumption*

Service Modules	Power Consumed and Dissipated	Power Passed Through
SM-X-ES3-16-P	40 W of 12 V power	480 W of -54 V
SM-X-ES3-24-P	47 W of 12 V power	720 W of -54 V
SM-X-ES3D-48-P	47W of 12 V power	1000 W of -54 V

PoE 48-Volt Power Restrictions

The following are the Power over Ethernet (PoE) 48 V power restrictions:

- Some platforms may limit –48 V power to a lower level than the maximum.
- The service module connector supports the 802.3at isolation requirements for the PoE/PoE+.
- The –48V power can dip to a low of approximately 46.2 V for a short duration when the system power supply fails and the RPS supply takes over.
- The Single Wide design can draw a maximum of 750 W on a supported platform.
- The Double Wide design can draw a maximum of 1000 W on a supported platform.
- The software must manage per-port current for each switch SKU without exceeding the total available PoE power.

Connecting to the Cisco SM-X Layer 2/3 ESM Ports

Both FE and GE ports are used to connect PCs or workstations to the network.

A 10/100/1000 Gigabit Ethernet (GE) port can be used as an uplink port to connect to another router or a server, or the GE port can trunk to another Cisco SM-X Layer 2/3 ESM or switch located in the same chassis or in a separate installation.



Note

Connecting a GE port to the network requires a Category 5 cable with RJ-45 male connectors, not provided with the switch module. Category 5 cables are widely available.



Warning

To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the Cisco SM-X Layer 2/3 ESM only to intra-building or unexposed wiring or cable. The intra-building port(s) of the equipment or subassembly must not be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring. The intra-building cable must be shielded and the shield must be grounded at both ends.

Related Documents

Related Topic	Document Title
Configuration guide for the Cisco SM-X Layer 2/3 ESM	Cisco SM-X Layer 2/3 EtherSwitch Service Module Configuration Guide
Hardware installation instructions for service modules	Hardware Installation Guide for the Cisco 4451-X Integrated Services Router
General information about configuration and the command reference.	Software Configuration Guide for the Cisco 4451-X Integrated Services Router
Regulatory compliance information for the Cisco 4451-X ISR.	Regulatory Compliance and Safety Information for the Cisco 4451-X Integrated Services Router

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: www.cisco.com/go/trademarks. Third-party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)

Any Internet Protocol (IP) addresses used in this document are not intended to be actual addresses. Any examples, command display output, and figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses in illustrative content is unintentional and coincidental.

© 2014 Cisco Systems, Inc. All rights reserved.