Installation and Configuration Note for the Cisco Catalyst 4500 E-Series Supervisor Engine 6L-E

Product Numbers: WS-X45-SUP6L-E= Cisco Catalyst 4500 E-Series Supervisor Engine 6L-E, MEM-X45-512MB-LE, MEM-X45-1GB-LE

This publication describes how to install and verify the operation of the Catalyst 4500 E-series Supervisor Engine 6L-E. Refer to the software configuration guide for your switch for configuration information for the supervisor engines and switching modules.

Note Catalyst 4500 E-series switching modules require an E-Series Supervisor Engine running a software image compatible with that supervisor engine. Refer to your switch's release notes for compatibility information.

Contents

This document contains these sections:

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Safety Overview

Throughout this publication, safety warnings appear in procedures that can harm you if performed incorrectly. A warning symbol precedes each warning statement.

Warning   **IMPORTANT SAFETY INSTRUCTIONS**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

SAVE THESE INSTRUCTIONS

Waarschuwing   **BELANGRIJKE VEILIGHEIDSINSTRUCTIES**

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van de standaard praktijken om ongelukken te voorkomen. Gebruik het nummer van de verklaring onderaan de waarschuwing als u een vertaling van de waarschuwing die bij het apparaat wordt geleverd, wilt raadplegen.

BEWAAR DEZE INSTRUCTIES

Varoitus   **TÄRKEITÄ TURVALLISUUSOHJEITA**

Tämä varoitusmerkki merkitsee vaaraa. Tilanne voi aiheuttaa ruumiillisia vammoja. Ennen kuin käsittelet laitteistoa, huomioi sähköpiirien käsittelemiseen liittyvät riskit ja tutustu onnettomuuksien yleisiin ehkäisytapoihin. Turvallisuusvaroitusten käännökset löytyvät laitteen mukana toimitettujen käännettyjen turvallisuusvaroitusten joukosta varoitusten lopussa näkyvien lausuntonumeroiden avulla.

SÄILYTÄ NÄMÄ OHJEET

Attention   **IMPORTANTES INFORMATIONS DE SÉCURITÉ**

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers liés aux circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions des avertissements figurant dans les consignes de sécurité traduites qui accompagnent cet appareil, référez-vous au numéro de l'instruction situé à la fin de chaque avertissement.

CONSERVEZ CES INFORMATIONS

Warnung   **WICHTIGE SICHERHEITSHINWEISE**

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu Verletzungen führen kann. Machen Sie sich vor der Arbeit mit Geräten mit den Gefahren elektrischer Schaltungen und den üblichen Verfahren zur Vorbeugung vor Unfällen vertraut. Suchen Sie mit der am Ende jeder Warnung angegebenen Anweisungsnummer nach der jeweiligen Übersetzung in den übersetzten Sicherheitshinweisen, die zusammen mit diesem Gerät ausgeliefert wurden.

BEWAHREN SIE DIESE HINWEISE GUT AUF.

Avvertenza   **IMPORTANTI ISTRUZIONI SULLA SICUREZZA**

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Utilizzare il numero di istruzione presente alla fine di ciascuna avvertenza per individuare le traduzioni delle avvertenze riportate in questo documento.

CONSERVARE QUESTE ISTRUZIONI

Advarsel   **VIKTIGE SIKKERHETSINSTRUKSJONER**

Dette advarselssymbolet betyr fare. Du er i en situasjon som kan føre til skade på person. Før du begynner å arbeide med noe av utstyret, må du være oppmerksom på farene forbundet med elektriske kretser, og kjenne til standardprosedyrer for å forhindre ulykker. Bruk nummeret i slutten av hver advarsel for å finne oversettelsen i de oversatte sikkerhetsadvarslene som fulgte med denne enheten.

TA VARE PÅ DISSE INSTRUKSJONENE

Aviso   **INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

Este símbolo de aviso significa perigo. Você está em uma situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha conhecimento dos perigos envolvidos no manuseio de circuitos elétricos e familiarize-se com as práticas habituais de prevenção de acidentes. Utilize o número da instrução fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham este dispositivo.

GUARDE ESTAS INSTRUÇÕES

¡Advertencia!   **INSTRUCCIONES IMPORTANTES DE SEGURIDAD**

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

GUARDE ESTAS INSTRUCCIONES

Varning! **VIKTIGA SÄKERHETSANVISNINGAR**

Denna varningssignal signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanliga förfaranden för att förebygga olyckor. Använd det nummer som finns i slutet av varje varning för att hitta dess översättning i de översatta säkerhetsvarningar som medföljer denna anordning.

SPARA DESSA ANVISNINGAR

FONTOS BIZTONSÁGI ELOÍRÁSOK

Ez a figyelmezeto jel veszélyre utal. Sérülésveszélyt rejto helyzetben van. Mielott bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplo figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található; a fordítás az egyes figyelmeztetések végén látható szám alapján keresheto meg.

ORIZZE MEG EZEKET AZ UTASÍTÁSOKAT!

Предупреждение **ВАЖНЫЕ ИНСТРУКЦИИ ПО СОБЛЮДЕНИЮ ТЕХНИКИ БЕЗОПАСНОСТИ**

Этот символ предупреждения обозначает опасность. То есть имеет место ситуация, в которой следует опасаться телесных повреждений. Перед эксплуатацией оборудования выясните, каким опасностям может подвергаться пользователь при использовании электрических цепей, и ознакомьтесь с правилами техники безопасности для предотвращения возможных несчастных случаев. Воспользуйтесь номером заявления, приведенным в конце каждого предупреждения, чтобы найти его переведенный вариант в переводе предупреждений по безопасности, прилагаемом к данному устройству.

СОХРАНИТЕ ЭТИ ИНСТРУКЦИИ

警告 重要的安全性说明

此警告符号代表危险。您正处于可能受到严重伤害的工作环境中。在您使用设备开始工作之前，必须充分意识到触电的危险，并熟练掌握防止事故发生的标准工作程序。请根据每项警告结尾提供的声明号码来找到此设备的安全性警告说明的翻译文本。

请保存这些安全性说明

安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止策に留意してください。警告の各国語版は、各注意事項の番号を基に、装置に付属の「Translated Safety Warnings」を参照してください。

これらの注意事項を保管しておいてください。

주의 중요 안전 지침

이 경고 기호는 위험을 나타냅니다. 작업자가 신체 부상을 일으킬 수 있는 위험한 환경에 있습니다. 장비에 작업을 수행하기 전에 전기 회로와 관련된 위험을 숙지하고 표준 작업 관례를 숙지하여 사고를 방지하십시오. 각 경고의 마지막 부분에 있는 경고문 번호를 참조하여 이 장치와 함께 제공되는 번역된 안전 경고문에서 해당 번역문을 찾으십시오.

이 지시 사항을 보관하십시오.

Aviso **INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

Este símbolo de aviso significa perigo. Você se encontra em uma situação em que há risco de lesões corporais. Antes de trabalhar com qualquer equipamento, esteja ciente dos riscos que envolvem os circuitos elétricos e familiarize-se com as práticas padrão de prevenção de acidentes. Use o número da declaração fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham o dispositivo.

GUARDE ESTAS INSTRUÇÕES

Advarsel **VIGTIGE SIKKERHEDSANVISNINGER**

Dette advarselssymbol betyder fare. Du befinder dig i en situation med risiko for legemesbeskadigelse. Før du begynder arbejde på udstyr, skal du være opmærksom på de involverede risici, der er ved elektriske kredsløb, og du skal sætte dig ind i standardprocedurer til undgåelse af ulykker. Brug erklæringsnummeret efter hver advarsel for at finde oversættelsen i de oversatte advarsler, der fulgte med denne enhed.

GEM DISSE ANVISNINGER

تحذير ⁨إرشادات الأمان الهامة⁩

⁨يوضح رمز التحذير هذا وجود خطر. وهذا يعني أنك متواجد في مكان قد ينتج عنه التعرض لإصابات. قبل بدء العمل،⁩
⁨احذر مخاطر التعرض للصدمات الكهربائية وكن على علم بالإجراءات القياسية للحيلولة دون وقوع أي حوادث. استخدم⁩
⁨رقم البيان الموجود في آخر كل تحذير لتحديد مكان ترجمته داخل تحذيرات الأمان المترجمة التي تأتي مع الجهاز.⁩
⁨قم بحفظ هذه الإرشادات⁩

Upozorenje **VAŽNE SIGURNOSNE NAPOMENE**

Ovaj simbol upozorenja predstavlja opasnost. Nalazite se u situaciji koja može prouzročiti tjelesne ozljede. Prije rada s bilo kojim uređajem, morate razumjeti opasnosti vezane uz električne sklopove, te biti upoznati sa standardnim načinima izbjegavanja nesreća. U prevedenim sigurnosnim upozorenjima, priloženima uz uređaj, možete prema broju koji se nalazi uz pojedino upozorenje pronaći i njegov prijevod.

SAČUVAJTE OVE UPUTE

Upozornění   DŮLEŽITÉ BEZPEČNOSTNÍ POKYNY

Tento upozorňující symbol označuje nebezpečí. Jste v situaci, která by mohla způsobit nebezpečí úrazu. Před prací na jakémkoliv vybavení si uvědomte nebezpečí související s elektrickými obvody a seznamte se se standardními opatřeními pro předcházení úrazům. Podle čísla na konci každého upozornění vyhledejte jeho překlad v přeložených bezpečnostních upozorněních, která jsou přiložena k zařízení.

USCHOVEJTE TYTO POKYNY

Προειδοποίηση   ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ

Αυτό το προειδοποιητικό σύμβολο σημαίνει κίνδυνο. Βρίσκεστε σε κατάσταση που μπορεί να προκαλέσει τραυματισμό. Πριν εργαστείτε σε οποιοδήποτε εξοπλισμό, να έχετε υπόψη σας τους κινδύνους που σχετίζονται με τα ηλεκτρικά κυκλώματα και να έχετε εξοικειωθεί με τις συνήθεις πρακτικές για την αποφυγή ατυχημάτων. Χρησιμοποιήστε τον αριθμό δήλωσης που παρέχεται στο τέλος κάθε προειδοποίησης, για να εντοπίσετε τη μετάφρασή της στις μεταφρασμένες προειδοποιήσεις ασφαλείας που συνοδεύουν τη συσκευή.

ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ

אזהרה

הוראות בטיחות חשובות

סימן אזהרה זה מסמל סכנה. אתה נמצא במצב העלול לגרום לפציעה. לפני שתעבוד עם ציוד כלשהו, עליך להיות מודע לסכנות הכרוכות במעגלים חשמליים ולהכיר את הנהלים המקובלים למניעת תאונות. השתמש במספר ההוראה המסופק בסופה של כל אזהרה כד לאתר את התרגום באזהרות הבטיחות המתורגמות שמצורפות להתקן.

שמור הוראות אלה

Opomena   ВАЖНИ БЕЗБЕДНОСНИ НАПАТСТВИЈА
Симболот за предупредување значи опасност. Се наоѓате во ситуација што може да предизвика телесни повреди. Пред да работите со опремата, бидете свесни за ризикот што постои кај електричните кола и треба да ги познавате стандардните постапки за спречување на несреќни случаи. Искористете го бројот на изјавата што се наоѓа на крајот на секое предупредување за да го најдете неговиот период во преведените безбедносни предупредувања што се испорачани со уредот.
ЧУВАЈТЕ ГИ ОВИЕ НАПАТСТВИЈА

Ostrzeżenie   **WAŻNE INSTRUKCJE DOTYCZĄCE BEZPIECZEŃSTWA**

Ten symbol ostrzeżenia oznacza niebezpieczeństwo. Zachodzi sytuacja, która może powodować obrażenia ciała. Przed przystąpieniem do prac przy urządzeniach należy zapoznać się z zagrożeniami związanymi z układami elektrycznymi oraz ze standardowymi środkami zapobiegania wypadkom. Na końcu każdego ostrzeżenia podano numer, na podstawie którego można odszukać tłumaczenie tego ostrzeżenia w dołączonym do urządzenia dokumencie z tłumaczeniami ostrzeżeń.

NINIEJSZE INSTRUKCJE NALEŻY ZACHOWAĆ

Upozornenie   **DÔLEŽITÉ BEZPEČNOSTNÉ POKYNY**

Tento varovný symbol označuje nebezpečenstvo. Nachádzate sa v situácii s nebezpečenstvom úrazu. Pred prácou na akomkoľvek vybavení si uvedomte nebezpečenstvo súvisiace s elektrickými obvodmi a oboznámte sa so štandardnými opatreniami na predchádzanie úrazom. Podľa čísla na konci každého upozornenia vyhľadajte jeho preklad v preložených bezpečnostných upozorneniach, ktoré sú priložené k zariadeniu.

USCHOVAJTE SI TENTO NÁVOD

Supervisor Engine 6L-E

This section describes the Catalyst 4500 E-series Supervisor Engine 6L-E (WS-X45-SUP6L-E). See Figure 1. This supervisor engine provides IPv6 data path and data control for all Layer 2 network interfaces, and provides 10-Gigabit Ethernet interfaces for uplinks.

The Supervisor Engine 6L-E is supported in the Catalyst 4503, 4506, 4507R, 4503-E, 4506-E, and 4507R-E switches. On the Catalyst 4503, 4503-E, 4506, and 4506-E switches, you can install the Supervisor Engine 6L-E only in slot 1. On the Catalyst 4507R switch, you install the primary supervisor engine in slot 1, and you can install an optional redundant supervisor engine in slot 2. On the Catalyst 4507R-E switch, you install the primary supervisor engine in slot 3, and you can install an optional redundant supervisor engine in slot 4. The supervisor engines in a redundant system must be of the same type.

The supervisor engine is hot swappable, but packets are not forwarded when the last supervisor engine has been removed from the switch. When a supervisor engine is reinserted into the switch, the supervisor engine reboots.

Figure 1　　　*Cisco Catalyst 4500 E-Series Supervisor Engine 6L-E (WS-X45-SUP6L-E)*
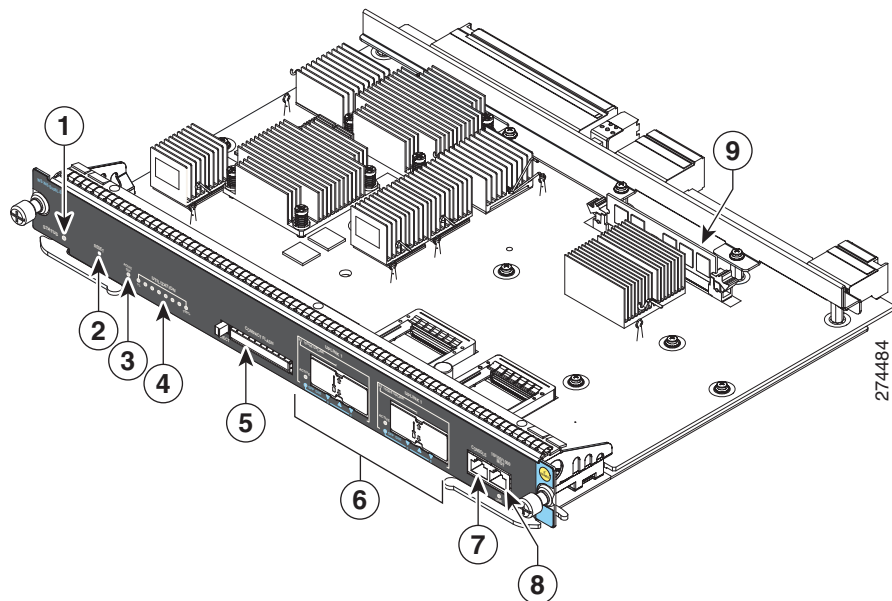
1	Status LED	**4**	Utilization LEDs	**7**	Console port
2	Reset button	**5**	Compact flash port	**8**	Management port
3	Active Supervisor LED	**6**	Uplink ports	**9**	DIMM

The supervisor engine includes interfaces for SNMP, console, and Telnet, and provides management functions, such as environmental status monitoring.

The Supervisor Engine 6L-E provides the following features:

- 512-MB onboard DIMM memory (upgradeable to 1 GB)

- 128-MB onboard flash memory (in addition to compact flash memory)

- Compact flash port

- 280-Gbps switching capacity, 225 million packets-per-second actual forwarding rate (v4), 110 million packets-per-second actual forwarding rate (v6)

- Support for up to 55,000 MAC addresses for Layer 2 switching (up to 64,000 entries, 16-way associative lookup table)

- Support for up to 4,094 VLANs, 802.1Q VLAN tagging on all ports

- Up to 32K unicast and multicast forwarding entries, expandable to 64 K unicast and multicast IPV4 forwarding information base (FIB) entries

- Support for Catalyst 4500 series and Catalyst 4500 E-series switching modules (except EoL models)

- Default Layer 2 forwarding at startup (hardware based)

- Broadcast suppression on a per-port basis

- Multicast suppression on a per-port basis

- Unicast suppression on a per-port basis

- EtherChannel at 10/100/1000 Mbps and 10Gbps

- Protocol filtering on a per-port basis

- Dynamic protocol filtering

- Support for IEEE 802.3x flow control

- Hardware-based multicast

- Hardware-based access lists

- Supervisor engine redundancy between primary and standby supervisor engines in Catalyst 4507R and Catalyst 4507R-E switches

- 802.1Q tunneling

- Storm control in hardware

Features of the Supervisor Engine Front Panel

The following sections describe the LEDs, connectors, and switches on the Catalyst 4500 E-series Supervisor Engine 6L-E:

LEDs

Table 1 describes the LEDs on the supervisor engine front panel.

Table 1   Supervisor Engine LEDs (WS-X45-SUP6L-E)

LED	LED Status	Description
STATUS		Indicates the results of a series of self-tests.
	Green	All diagnostic tests passed.
	Red	A test failed.
	Orange	System boot or diagnostic test is in progress.
	Off	Module is disabled.
UTILIZATION	Green 1–100%	If the switch is operational, this display indicates the current traffic load over the backplane (as an approximate percentage).

Table 1   Supervisor Engine LEDs (WS-X45-SUP6L-E) (Continued)

LED	LED Status	Description
Link		Indicates the status of the 10/100/1000 BASE-T Ethernet management port or uplink ports.
	Green	The link is operational.
	Orange	The link is disabled by user.
	Flashing orange	The power-on self-test indicates a faulty port.
	Off	No signal is detected or there is a link configuration failure.
Active		Indicates whether the uplink port is active.
	Green	The port is active.
	Off	The port is not active.

10-Gigabit Ethernet Uplink Ports

The 10-Gigabit Ethernet uplink ports operate in full-duplex mode only. These ports use the hot-swappable X2 optical transceivers. The X2s have SC connectors to interface with multimode fiber (MMF) and single-mode fiber (SMF) cable. For further information on X2s, see the "X2 Installation" section on page 25.

When two Supervisor Engine 6L-Es are present in a Catalyst 4507R or Catalyst 4507R-E switch, one X2 uplink is active on both the primary (active) and secondary (standby) supervisor engines by default, or two uplinks will be active in a nonredundant configuration.

Gigabit Ethernet SFP Uplink Ports

If you want to use SFPs instead of X2s as your uplink transceivers, you can use the Cisco TwinGig converter modules already provided in the X2 slots. Installation documentation for Cisco TwinGig converter modules can be found at:

http://www.cisco.com/en/US/docs/switches/lan/catalyst3750e_3560e/hardware/install/notes/1757202.html

Note   The 10-Gigabit Ethernet ports default to operating at 10-Gigabit, and will need to be configured in Software to use the Cisco TwinGig converter modules. For details on this configuration change, refer to the chapter on configuring interfaces in the configuration guide for your software release.
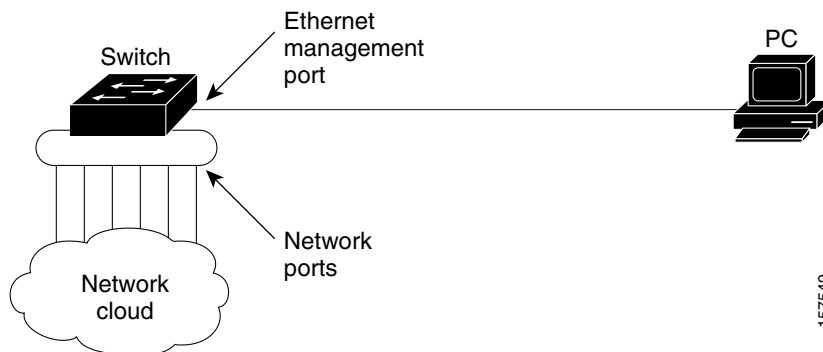
Ethernet Management Port

The Ethernet management port, also referred to as the *Fa1 or fastethernet1 port*, is a Layer 3 host port to which you can connect a PC. You can use the Ethernet management port instead of the switch console port for network management. When managing a switch, connect the PC to the Ethernet management port on a Catalyst 4500 series switch. (Figure 2).

Note   When connecting a PC to the Ethernet management port, you must assign an IP address.

Figure 2   Connecting a Switch to a PC

By default, the Ethernet management port is enabled. The switch cannot route packets from the Ethernet management port to a network port, and from the network port to the Ethernet port. To obtain these, the Fa1 interface is automatically placed in a separate routing domain (or VRF domain), called *mgmtVrf*. (You observe the *ip Vrf forwarding mgmtVrf* line in the running configuration when you boot up.)

Even though the Ethernet management port does not support routing, you might need to enable routing protocols on the port. As illustrated in Figure 3, you must enable routing protocols on the Ethernet management port when the PC is multiple hops away from the switch and the packets must pass through multiple Layer 3 devices to reach the PC.

Figure 3   Network Example with Routing Protocols Enabled
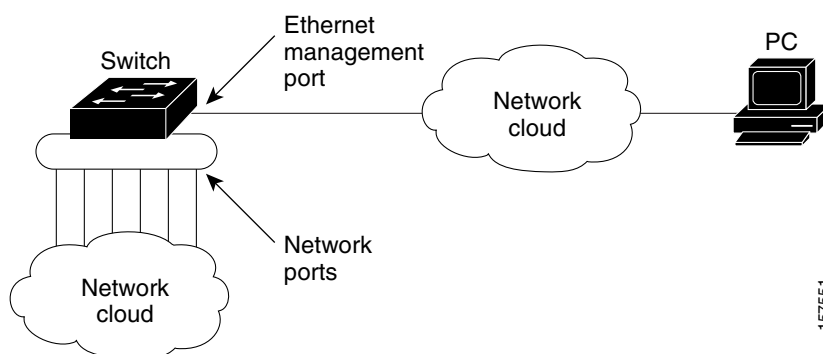
The specific implementation of Ethernet management port depends on the redundancy model you are applying.

Console Port

The Catalyst 4500 E-series Supervisor Engine 6L-E console port has an EIA/TIA-232 RJ-45 connector. The console port allows you to perform the following functions:

- Configure the switch from the CLI
- Monitor network statistics and errors
- Configure SNMP agent parameters

Note EIA/TIA-232 was known as recommended standard RS-232 before its acceptance as a standard by the Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA).

Reset Button

The Reset button is used to restart the switch.

Note Use a paper clip or other small, pointed object to press the Reset button.

Compact Flash Port

The Flash port accepts both 64 MB and 128 MB Type 1 CompactFlash cards. You can use it for file transfer tasks such as loading a new software image. The Flash card is optional and can be obtained from third-party suppliers.

For more information, refer to *Using the Compact Flash on the Catalyst 4500 Series Supervisor Engines* at the following URL:

http://www.cisco.com/en/US/docs/switches/lan/catalyst4500/hardware/configuration/notes/OL_2788.html

Port Cabling Specifications

This section provides port cabling specifications and includes the following subsections:

The length of your networks and the distances between connections depend on the type of signal, the signal speed, and the transmission medium (the type of cabling used to transmit the signals). The distance and rate limits in this document are the IEEE-recommended maximum speeds and distances for signaling. Table 2 shows the transmission speed versus the distance.

Table 2   *EIA/TIA-232 Transmission Speed in Contrast with Distance*

Rate (bps)	Distance (ft)	Distance (m)
2400	200	60
4800	100	30
9600	50	15
19,200	25	7.6
38,400	12	3.7

Maximum Cable Distances

Table 3 shows the maximum cable distances for transceiver speed and cable type.

Table 3   *Maximum Cable Distances*

Transceiver Speed (Mbps)	Cable Type	Duplex Mode	Maximum Distance Between Stations
10	Category 3 UTP	Half or full	328 ft (100 m)
100	Category 5 UTP	Half or full	328 ft (100 m)
1000	Category 5 UTP	Half or full	328 ft (100 m)
1000	SMF	Half or full	43.4 to 62 mi (70 to 100 km)
1000	MMF	Full	1804 ft (550 m)
10 GB	SMF	Half or full	24.84 mi (40 km)
10 GB	MMF	Full	984.3 ft (300 m)

Removing the Supervisor Engine

All Catalyst 4500 series switches support hot swapping, which lets you install, remove, replace, and rearrange supervisor engines and switching modules without powering the system off. When the system detects that a switching module has been installed or removed, it runs diagnostic and discovery routines automatically, acknowledges the presence or absence of the module, and resumes system operation with no operator intervention.

This section contains the following subsections:

- Required Tools, page 14
- Installing the Supervisor Engine, page 15
- Removing the Supervisor Engine, page 17

Note   When installing modules in a chassis with empty slots, populate the upper empty slots first and work down.

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

⚠️
Warning   **Ultimate disposal of this product should be handled according to all national laws and regulations.**
Statement 1040

Required Tools

You will need these tools to install a supervisor engine in a Catalyst 4500 series switch:

- Number 1 and number 2 Phillips screwdrivers for the captive installation screws on most modules
- 3/16-in. flat-blade screwdriver for the captive installation screws on other modules
- Antistatic mat or antistatic foam
- Wrist strap or other grounding device

✎
Note   Whenever you handle supervisor engines, use a wrist strap or other grounding device to prevent electrostatic discharge (ESD) damage.

Preventing Electrostatic Discharge Damage

ESD damage, which can occur when electronic cards or components are improperly handled, results in complete or intermittent failures. Port adapters and processor modules consist of printed circuit boards that are fixed in metal carriers. Electromagnetic interference (EMI) shielding and connectors are integral components of the carrier. Although the metal carrier helps to protect the board from ESD, use a preventive antistatic strap during handling.

Following are guidelines for preventing ESD damage:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to an unfinished chassis surface.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use any available ejector levers or captive installation screws to release the bus connectors from the backplane or midplane.
- Handle carriers by available handles or edges only; avoid touching the printed circuit boards or connectors.

- Place a removed component board-side-up on an antistatic surface or in a static shielding container. If you plan to return the component to the factory, immediately place it in a static shielding container.

- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.

- Never attempt to remove the printed circuit board from the metal carrier.

⚠

Caution   For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 megohm (Mohm).

Installing the Supervisor Engine

Catalyst 4500 series and Catalyst 4500 E-series switches have horizontal chassis slots that are numbered from top to bottom. On the Catalyst 4503, 4503-E, Catalyst 4506, and 4506-E switches, you can install the supervisor engine only in slot 1. On the Catalyst 4507R switch, you install the primary supervisor engine in slot 1, and you can install an optional redundant supervisor engine in slot 2. On the Catalyst 4507R-E switch, you install the primary supervisor engine in slot 3, and you can install an optional redundant supervisor engine in slot 4. The supervisor engines in a redundant system must be of the same type.

⚠

Warning   **Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing.** Statement 1034

⚠

Caution   To prevent ESD damage, handle supervisor engines by the carrier edges only.

To install a supervisor engine in a Catalyst 4500 E-series switch, follow this procedure:

Step 1   Take the necessary precautions to prevent ESD damage as described in the installation guide for your switch.

Step 2   Ensure that you have enough clearance to accommodate any interface equipment that you will connect directly to the supervisor engine ports.

Step 3   Loosen the captive installation screws that secure the switching-module filler plate or the existing supervisor engine (whichever is present) and remove it.

Step 4   Remove the supervisor engine filler plate or the existing supervisor engine from slot 1. If a switching module filler plate was installed, save it for future use. If you are removing an existing supervisor engine, see the "Removing the Supervisor Engine" section on page 17.

Step 5   To install the new supervisor engine, grasp the switching module front panel with one hand and place your other hand under the carrier to support the supervisor engine, as shown in Figure 4. Do not touch the printed circuit boards or connector pins.

Step 6   Align the edges of the supervisor engine carrier with the slot guides on the sides of the switch chassis, as shown in Figure 4.

Figure 4   *Installing the Supervisor Engine in the Chassis (Catalyst 4506-E Shown)*
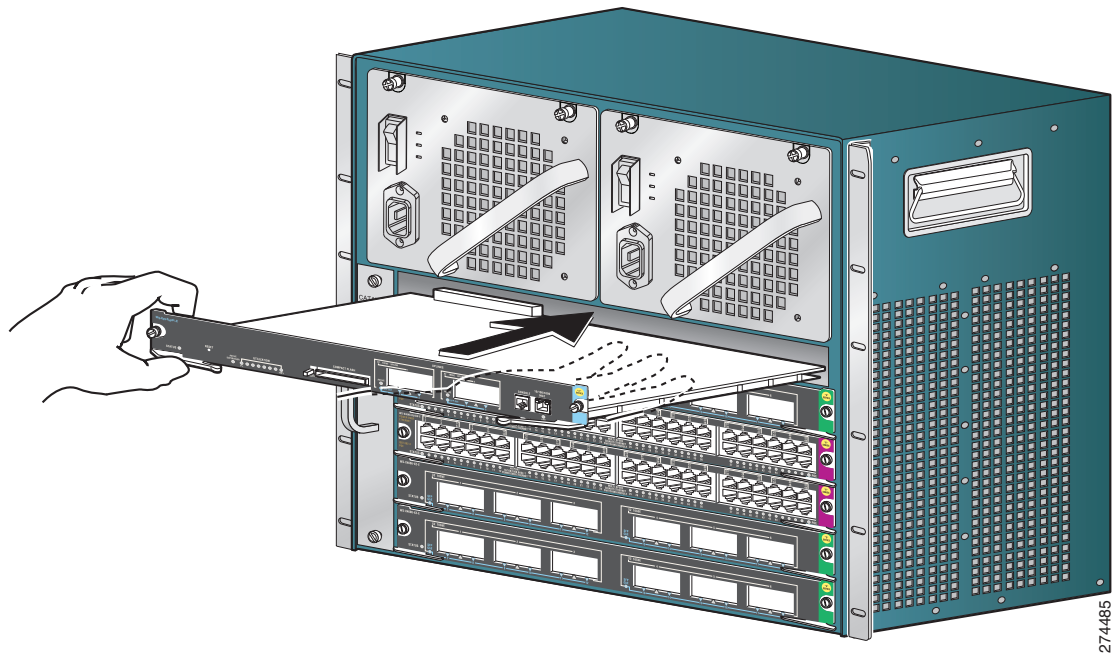
Step 7   Pivot the two module ejector levers out and away from the faceplate.

Step 8   Carefully slide the supervisor engine into the slot until the notches on both ejector levers engage the chassis sides.

Step 9   Using the thumb and forefinger of each hand, simultaneously pivot in both ejector levers to fully seat the supervisor engine in the backplane connector.

⚠
Caution   Always use the ejector levers when installing or removing a supervisor engine. A supervisor engine that is partially seated in the backplane will not function correctly.

Step 10   Use a screwdriver to tighten the captive installation screws on each end of the supervisor engine faceplate.

To check the status of the module, follow these steps:

Step 1   Ensure that the LED labeled Status is green (module operational).

Step 2   When the switch is online, enter the **show module** command. Verify that the system acknowledges the new module and that the module's status is good.

Step 3   If the module is not operational, reseat it. If the module is still not operational, contact your customer service representative.

Removing the Supervisor Engine

⚠ **Warning** **Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 1051

⚠ **Warning** **Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing.** Statement 1034

⚠ **Caution** To prevent ESD damage, handle supervisor engines by the carrier edges only.

To remove a supervisor engine from a Catalyst 4500 E-series switch, follow this procedure:

Step 1 Disconnect any network interface cables attached to the ports on the supervisor engine that you intend to remove.

Step 2 Loosen the captive installation screws (see Figure 5).

Figure 5   *Captive Installation Screws and Ejector Levers*
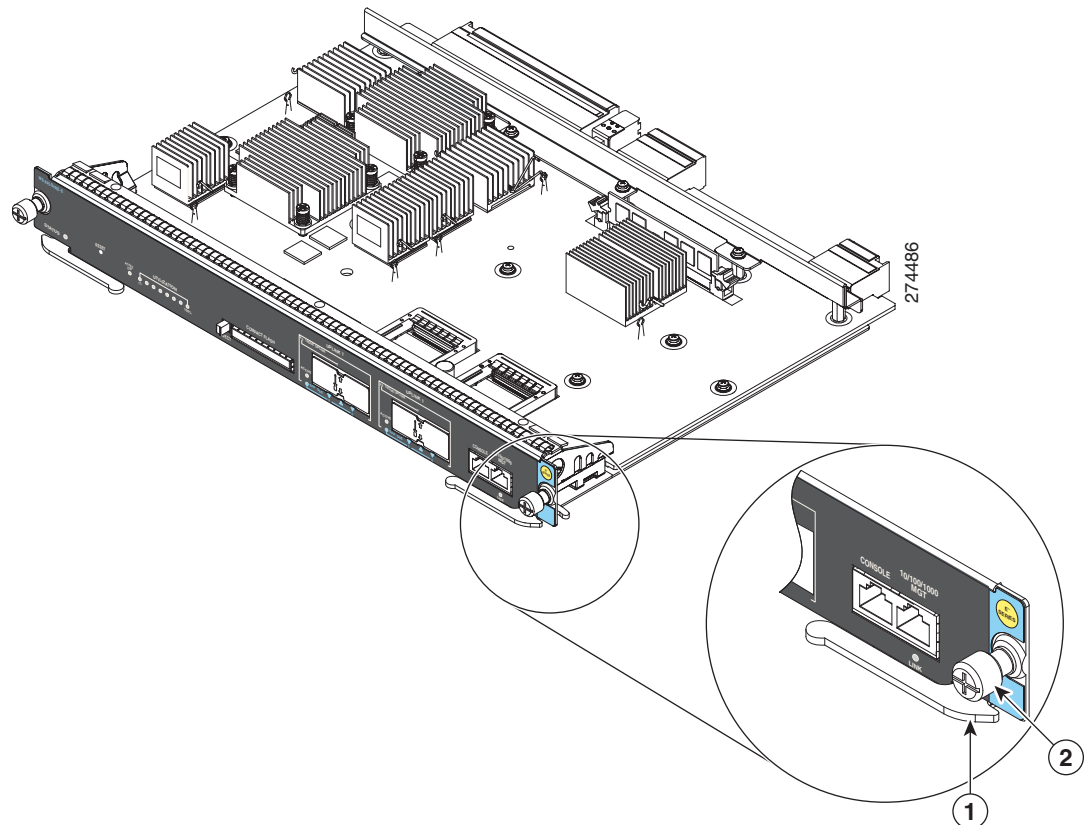
1	Ejector lever	**2**	Captive installation screw

Step 3 Grasp the left and right ejector levers and simultaneously pivot the levers outward to release the supervisor engine from the backplane connector. Figure 5 shows a close-up of the right ejector lever.

Step 4 Grasp the front panel of the supervisor engine with one hand and place your other hand under the carrier to support and guide it out of the slot. Do not touch the printed circuit boards or connector pins.

Step 5 Carefully pull the supervisor engine straight out of the slot, keeping your other hand under the carrier to guide it.

Step 6 Place the supervisor engine on an antistatic mat or antistatic foam, or immediately install it in another slot.

Step 7 In chassis configured with redundant supervisor engines, if the chassis slot is to remain empty, you must install either a blank faceplate (C4K-SLOT-CVR) or a blank line card (C4K-SLOT-CVR-E). The following guidelines explain when to use a blank faceplate and when to use a blank line card.

- If you have either a Catalyst 4507R or a Catalyst 4510R switch chassis, you must install the blank line card (C4K-SLOT-CVR-E) rather than the blank faceplate to cover the empty chassis slot. A blank faceplate does not direct sufficient airflow to adequately cool the remaining Supervisor Engine 6L-E.

- If you have any other Catalyst 4500 series chassis, you can install the blank faceplate (C4K-SLOT-CVR) over the empty chassis slot. The airflow is sufficient to adequately cool the remaining Supervisor Engine 6L-E.

⚠
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

Memory Upgrade

This section describes how to perform a memory upgrade from a MEM-X45-512MB-LE (shipped with the supervisor engine) to a MEM-X45-1GB-LE. You might need to upgrade memory on the Supervisor Engine 6L-E for the following reasons:

- To upgrade to a new Cisco IOS feature set or release that requires additional memory. (Memory requirements for each feature set and release are available in the release notes for that release.)

- To use very memory-intensive features.

This document describes how to upgrade dynamic memory. The Supervisor Engine 6L-E ships with 512 MB and can be upgraded to 1 GB in the form of an SDRAM SODIMM.

Tools and Equipment Needed

You need the following tools and equipment to remove and install DIMMs in a Supervisor Engine 6L-E:

- ESD-preventive wrist strap

- Antistatic mat

Performing a Memory Upgrade

This procedure presumes you have already removed the supervisor engine from the switch, as described in the "Removing the Supervisor Engine" section on page 17.

To upgrade the memory, follow these steps:

Step 1 Attach an ESD-preventive wrist strap and ensure that it makes good contact with your skin. Connect the equipment end of the wrist strap to the metal back plate of the chassis, avoiding contact with the connectors.

Step 2 On the mainboard, locate the DIMM module slot. The Supervisor Engine 6L-E has one slot, which already has a MEM-X45-512MB-LE installed. (See callout 9 in Figure 6.)

Figure 6   Cisco Catalyst 4500 E-Series Supervisor Engine 6L-E (WS-X45-SUP6L-E)
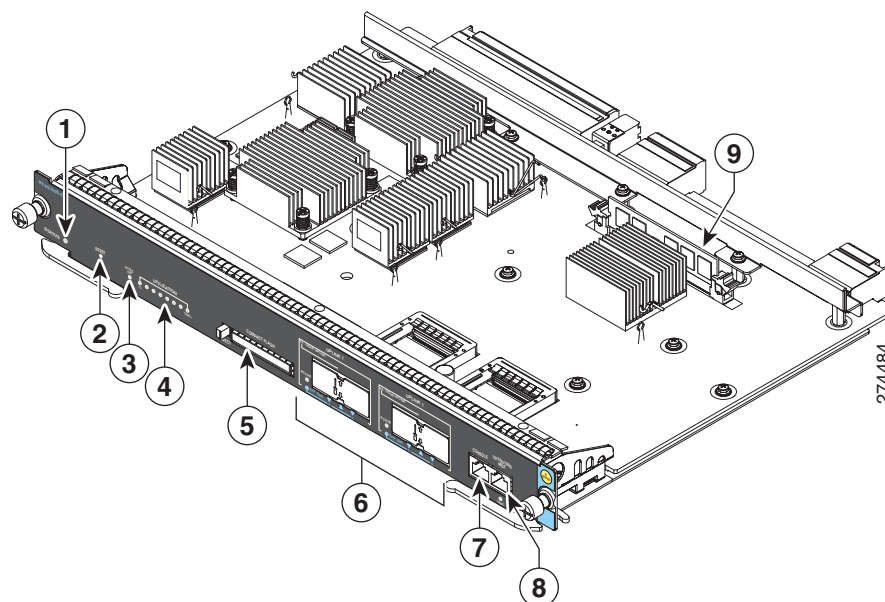
1	Status LED	**4**	Utilization LEDs	**7**	Console port
2	Reset button	**5**	Compact flash port	**8**	Management port
3	Active Supervisor LED	**6**	Uplink ports	**9**	DIMM

⚠️ **Caution**   Handle the SODIMM by the edges only; do not touch the memory modules, pins, or traces (metal fingers along the connector edge). Handle carefully. DIMMs are ESD-sensitive components and can be damaged by mishandling.

Step 3   Release the plastic clips for the DIMM slot, and press down on them to unseat the 512 MB DIMM
module. (See Figure 7.)

Figure 7   Removing DIMMs in the Supervisor Engine 6L-E

⚠
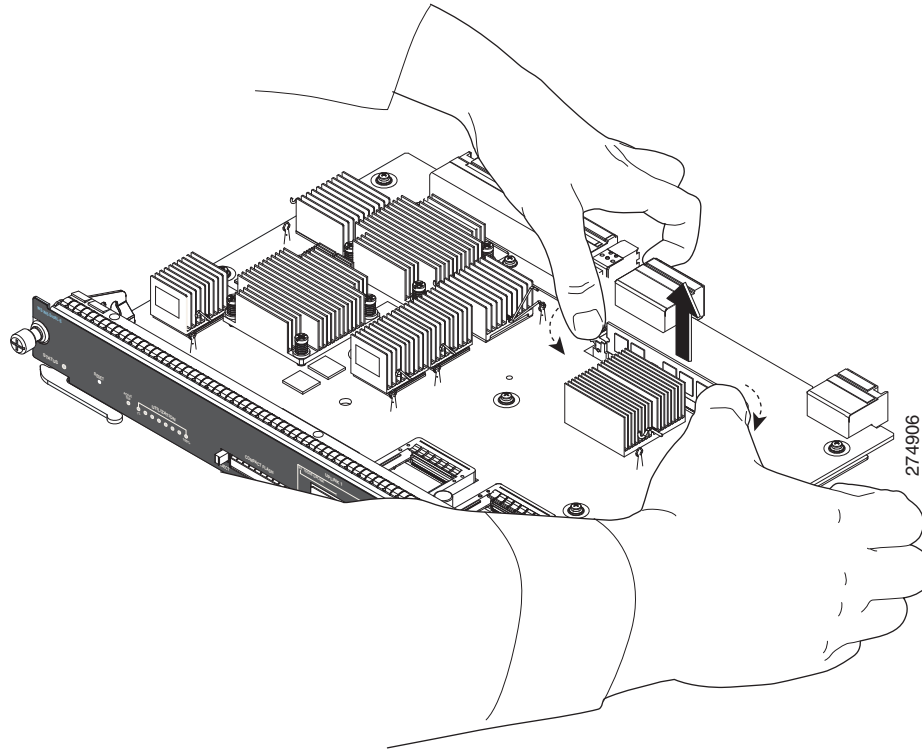
Caution   Handle the DIMM by the edges only; do not touch the memory modules, pins, or traces (metal fingers along the connector edge). Handle carefully. DIMMs are ESD-sensitive components and can be damaged by mishandling.

Step 4   Hold the DIMM between your index fingers (See Figure 8). The DIMM is notched on the connection edge, and there is a corresponding key on the memory slot, make sure they are oriented to seat correctly.

Figure 8   Handling a DIMM
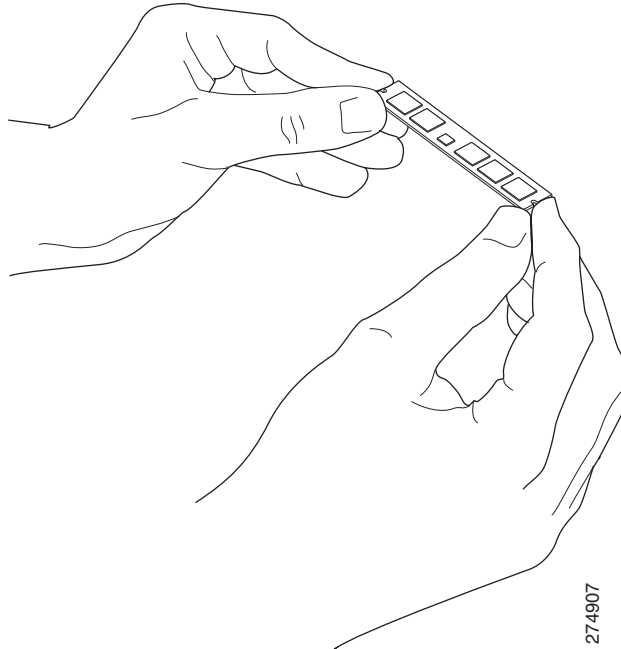
Step 5   Tilt the new 1 GB DIMM to the same angle as the socket, then insert the connector edge into the socket. Gently push into place until the plastic clips snap into place. (See Figure 9.)

Figure 9   ***Installing a DIMM***
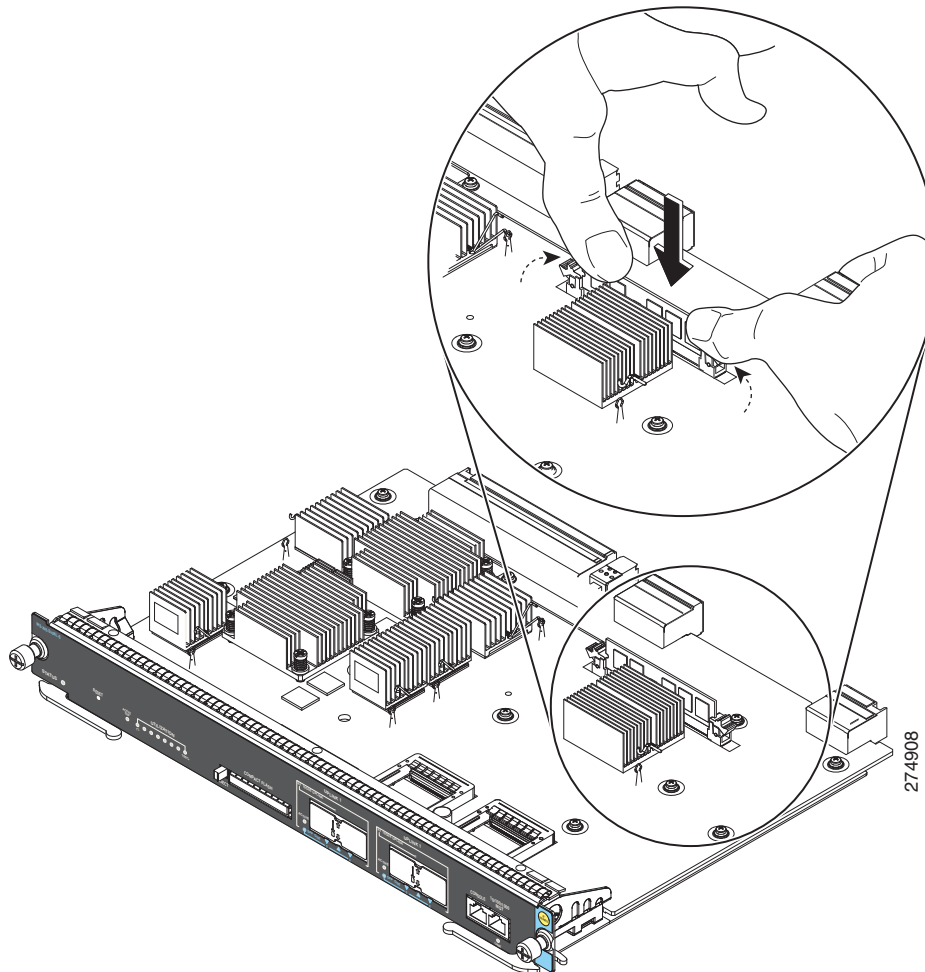
⚠ **Caution**   It is normal to feel some resistance when installing a DIMM, but do not use excessive force and do not touch the surface components.

Step 6   Check the plastic clips for a secure and similar fit. If necessary, carefully remove and reseat the DIMM.

Step 7   Replace the supervisor engine in the switch as described in the "Installing the Supervisor Engine" section on page 15.

Step 8   To verify the upgrade was successful, look for the following output lines in the bootup output, or in the results of a **show version** console command:

```
cisco WS-C4506 (MPC8548) processor (revision 0) with 1048576K bytes of memory.
Processor board ID FOX104810F8
MPC8548 CPU at 1GHz, Supervisor 6L-E
```

Attaching Module Interface Cables

Figure 10 and Figure 11 show the connector types used to attach interface cables to the supervisor engine.

Figure 10   RJ-45 Connector
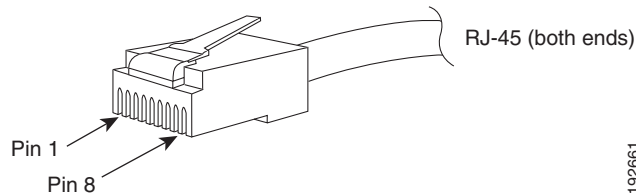
Warning   **To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables.** Statement 1021

Note   Always keep caps and plugs on the fiber-optic connectors on the cable and the switch when they are not in use.

Warning   **Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 1051

SC Connector

The SC connector, shown in Figure 11, is used to connect fiber-optic module ports or transceivers with the external SMF or MMF network.

Warning   **Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 1051

Note   Make sure that the optical connectors are clean before making the connections. Contaminated connectors can damage the fiber and cause data errors.

Always insert the network connector completely into the socket. A secure connection is especially important when you are establishing a connection between a module and a long distance (1.24 miles) (2 km) network or a module and a suspected highly attenuated network. If the link LED does not light, try removing the network cable plug and reinserting it firmly into the module socket. It is possible that dirt or skin oils have accumulated on the plug faceplate (around the optical-fiber openings), generating significant attenuation and reducing the optical power levels below threshold levels so that a link cannot be made.

⚠

Caution   Use extreme care when removing or installing connectors so that you do not damage the connector housing or scratch the end-face surface of the fiber. Always install protective covers on unused or disconnected components to prevent contamination. Always clean fiber connectors before installing them.

Figure 11   ***SC-Type Fiber-Optic Connector***
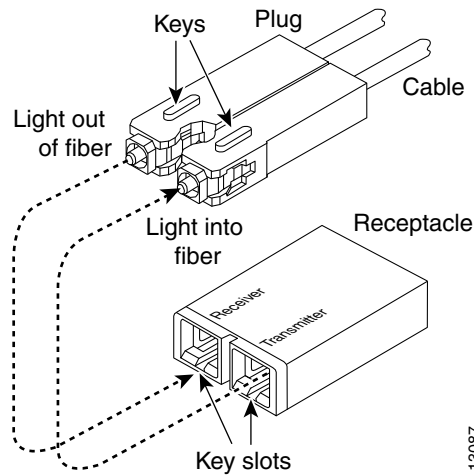
LC Connector

⚠

Warning   **Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 1051

The LC fiber-optic connector, shown in Figure 12, is a small form-factor fiber-optic connector that provides high-density fiber connectivity. The LC connector can be used with either MMF cable or SMF cable. The LC connector uses a latching clip mechanism that is similar to the one used on the RJ-45 copper connector.

✎

Note   Make sure that the optical connectors are clean before making the connections. Contaminated connectors can damage the fiber and cause data errors.

Figure 12   ***LC Fiber-Optic Connector***
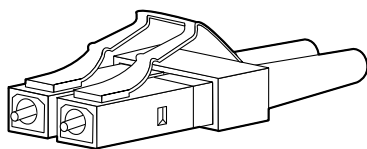
Configuring Your Supervisor Engine

For information and commands to configure your supervisor engine, refer to the software configuration guide for your switch. Configuration guides are located at:

http://www.cisco.com/en/US/products/hw/switches/ps4324/products_installation_and_configuration_guides_list.html

X2 Installation

An X2 transceiver is a hot swappable input/output device that plugs into the 10-Gigabit Ethernet port of the supervisor engine and links the supervisor engine with a fiber-optic network. X2 transceivers are online swappable.

Full documentation of the X2 transceiver is in the *10-Gigabit Ethernet X2 Transceiver Installation Note*.

You may also use Cisco TwinGig and Cisco OneX converter modules in these ports. Installation documentation for Cisco TwinGig converter modules can be found in the *Installation Notes for the Cisco TwinGig Converter Module.*

For supported X2 transceiver media types, refer to:

http://www.cisco.com/en/US/docs/interfaces_modules/transceiver_modules/installation/note/OL_23589.html

$\mathcal{Q}$

Tip For complete information on inspecting and cleaning fiber-optic connections, refer to the white-paper document at this URL:

http://www.cisco.com/en/US/tech/tk482/tk876/technologies_white_paper09186a0080254eba.shtml

⚠️

Caution The 10-Gigabit Ethernet X2 transceiver is a static-sensitive device. Always use an ESD wrist strap or similar individual grounding device when handling X2 transceivers or coming into contact with modules.

X2 Transceiver Maintenance Guidelines

To properly maintain X2 transceivers, follow these guidelines:

- To prevent ESD damage, follow normal handling procedures.
- When the transceiver is stored or when a fiber-optic cable is not plugged in, always keep plugs in the optical bores.
- The most common source of contaminants in the optical bores is debris picked up on the ferrules of the optical connectors. Use an alcohol swab or Kim-Wipe to clean the ferrules of the optical connector.

⚠️

Warning **Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 1051

SFP Guidelines

The Supervisor Engine 6L-E has two X2 ports that can support Cisco TwinGig modules providing two SFP connections to other network devices. You can have a total of four SFPs.

For installation information, refer to the *Cisco SFP and SFP+ Transceiver Module Installation Notes*.

Use only Cisco SFP modules on your Cisco device. Each SFP module has an internal serial EEPROM that is encoded with security information. This encoding provides a way for Cisco to identify and validate that the SFP module meets the requirements for the device.

For supported SFP transceiver media types, refer to:

http://www.cisco.com/en/US/docs/interfaces_modules/transceiver_modules/compatibility/matrix/OL_6982.html

http://www.cisco.com/en/US/docs/interfaces_modules/transceiver_modules/compatibility/matrix/OL632702.html

http://www.cisco.com/en/US/docs/interfaces_modules/transceiver_modules/compatibility/matrix/OL_6981.html

Fiber-Optic Connectors

Fiber-optic cable connectors can be damaged by improper cleaning and connection procedures. Dirty or damaged fiber-optic connectors can result in communication that is not repeatable or inaccurate.

Fiber-optic connectors differ from electrical or microwave connectors. In a fiber-optic system, light is transmitted through an extremely small fiber core. Because fiber cores are often 62.5 microns or less in diameter, and dust particles range from a tenth of a micron to several microns in diameter, dust and any contamination at the end of the fiber core can degrade the performance of the connector interface where the two cores meet. Therefore, the connector must be precisely aligned, and the connector interface must be absolutely free of trapped foreign material.

Connector loss, or insertion loss, is a critical performance characteristic of a fiber-optic connector. Return loss is also an important factor. Return loss specifies the amount of reflected light; the lower the reflection, the better the connection. The best physical contact connectors have return losses greater than -40 dB, although -20 to -30 dB is more common.

The connection quality depends on two factors: the type of connector and the proper cleaning and connection techniques. Dirty fiber connectors are a common source of light loss. Keep the connectors clean at all times, and keep the dust covers installed when the connectors are not in use.

Before installing any type of cable or connector, use a lint-free alcohol pad from a cleaning kit to clean the ferrule, the protective white tube around the fiber, and the end-face surface of the fiber.

As a general rule, whenever there is a significant, unexplained loss of light, clean the connectors.

⚠ **Caution** Use extreme care when removing or installing connectors so that you do not damage the connector housing or scratch the end-face surface of the fiber. Always install protective covers on unused or disconnected components to prevent contamination. Always clean fiber connectors before installing them.

To clean the optical connectors, use a CLETOP cassette cleaner (type A for SC connectors or type B for MT-RJ connectors) and follow the product directions. If a CLETOP cassette cleaner is not available, follow these steps:

Step 1   Use a lint-free tissue soaked in 99 percent pure isopropyl alcohol to gently wipe the faceplate. Wait five seconds for the surfaces to dry, and repeat.

Step 2   Remove any residual dust from the faceplate with clean, dry, oil-free compressed air.

Warning   **Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 1051

Step 3   Use a magnifying glass or inspection microscope to inspect the ferrule at an angle. Do not look directly into the aperture. Repeat the process if any contamination is detected.

The connectors used inside the system have been cleaned by the manufacturer and connected to the adapters in the proper manner. The operation of the system should be error free if the customer provides clean connectors on the application side, follows the previous directions, and follows these guidelines:

- Clean the connectors using either a CLETOP cassette cleaner (Type A for SC connectors and Type B for MT-RJ connectors) or lens tissues before connecting to the adapters. Use pure alcohol to remove contamination.

- Do not clean the inside of the connector adapters.

- Do not use force or quick movements when connecting the fiber-optic connectors in the adapters.

- Cover the connectors and adapters to keep the inside of the adapters or the surface of the connectors from getting dirty when you are not using the connectors or while you are cleaning the chassis.

Related Documentation

For more detailed installation and configuration information, refer to the following:

- *Catalyst 4500 Series Installation Guide*
- *Catalyst 4500 E-Series Switches Installation Guide*
- *Catalyst 4500 Series Module Installation Guide*
- *Regulatory Compliance and Safety Information for the Catalyst 4500 Series Switches*
- Software Configuration Guide
- Command Reference
- System Message Guide
- *10-Gigabit Ethernet X2 Transceiver Installation Note*
- *10-Gigabit Ethernet Transceiver Modules Compatibility Matrix*
- *Cisco SFP and SFP+ Transceiver Module Installation Notes*
- *Cisco Gigabit Ethernet Transceiver Modules Compatibility Matrix*
- *Inspection and Cleaning Procedures for Fiber-Optic Connections*
- *Installation Notes for the Cisco TwinGig Converter Module*

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation* at: http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html.

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