



# Octal-Port G.SHDSL SHTU-C Line Card FRU Installation and Replacement Notes

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**Product Number:** STUC-8-SHDSL-1=

This document provides information about installing and removing the octal-port single-pair high-speed digital subscriber line (DSL) line card. This product is also known as the symmetric high bit rate digital subscriber loop (G.SHDSL) transceiver unit—central office (SHTU-C) line card (8xG.SHDSL). The 8xG.SHDSL is a field-replaceable unit (FRU) for the following chassis:

- Cisco 6015
- Cisco 6160
- Cisco 6260



Warning

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**Only trained and qualified personnel should be allowed to install or replace this equipment.**

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# Introduction

The 8xG.SHDSL is designed for use in the Cisco 6015, Cisco 6160, and Cisco 6260 without a plain old telephone services (POTS) splitter configuration. In this configuration each modem is directly connected to one specific subscriber line through the main distribution frame (MDF).

The 8xG.SHDSL

- Supports eight G.SHDSL modem connections
- Supports trellis coded pulse amplitude modulation (TC-PAM) line encoding
- Converts G.SHDSL modulation from the line into digital data streams to and from the NI-2 card
- Supports fixed and adaptive rate modes



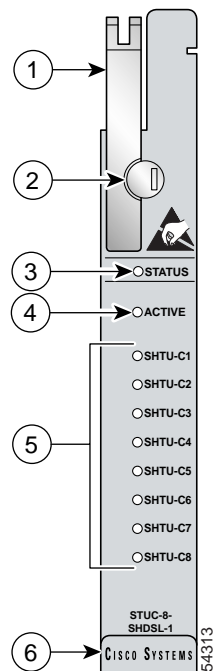
**Note**

The 8xG.SHDSL has deployment guidelines when used in the Cisco 6160 or Cisco 6260 systems (see [Figure 2 on page 6](#) and [Figure 3 on page 7](#)).

## Faceplate Features

[Figure 1](#) shows a close-up of the 8xG.SHDSL faceplate.

**Figure 1** 8xG.SHDSL Faceplate



1	Ejector lever	4	ACTIVE LED
2	Locking tab	5	Modem port status LEDs
3	STATUS LED	6	Extraction tab

Table 1 describes LEDs on the 8xG.SHDSL.

**Table 1** 8xG.SHDSL LEDs

LED	State	Function
STATUS	Green slow blinking	No errors, but no connection established.
	Green fast blinking	The image download is in progress.
	Green solid	NI-2 communication established.
	Red	The self-test or line card has failed.
	Off	The SHTU-C line card has a power failure.
ACTIVE	Green solid	The line card is in service.
	Off	The line card is not in service.
SHTU-C1	Green solid	Modem 1 is trained.
	Green blinking	Training is in progress for modem 1.
	Off	Modem 1 is idle.
SHTU-C2	Green solid	Modem 2 is trained.
	Green blinking	Training is in progress for modem 2.
	Off	Modem 2 is idle.
SHTU-C3	Green solid	Modem 3 is trained.
	Green blinking	Training is in progress for modem 3.
	Off	Modem 3 is idle.
SHTU-C4	Green solid	Modem 4 is trained.
	Green blinking	Training is in progress for modem 4.
	Off	Modem 4 is idle.
SHTU-C5	Green solid	Modem 5 is trained.
	Green blinking	Training is in progress for modem 5.
	Off	Modem 5 is idle.
SHTU-C6	Green solid	Modem 6 is trained.
	Green blinking	Training is in progress for modem 6.
	Off	Modem 6 is idle.
SHTU-C7	Green solid	Modem 7 is trained.
	Green blinking	Training is in progress for modem 7.
	Off	Modem 7 is idle.
SHTU-C8	Green solid	Modem 8 is trained.
	Green blinking	Training is in progress for modem 8.
	Off	Modem 8 is idle.

## Specifications

Table 2 lists the specifications for the 8xG.SHDSL.

**Table 2** 8xG.SHDSL Specifications

Specification	Description
Standards supported	<ul style="list-style-type: none"> <li>• TC-PAM without OPTIS (Overlapped PAM Transmission with Interlocking Spectra)</li> <li>• ITU G.991.2</li> <li>• ITU G.994.1</li> <li>• ETSI SDSL, TM6(00)10</li> <li>• ETSI SDSL DRAFT (TS 101 524)</li> </ul>
Power consumption	11.3W at 136 Kbps 15.0W at 1.554 Mbps 16.5W at 2.312 Mbps
Maximum data rates (per port)	2.312 Mbps
Maximum data rate (per card) <sup>1</sup>	Minimum software—Cisco IOS Release 12.1(7)DA2 <ul style="list-style-type: none"> <li>• 18.5 Mbps downstream</li> <li>• 5.0 Mbps for odd ports upstream</li> <li>• 5.0 Mbps for even ports upstream</li> </ul> Minimum software—Cisco IOS Release 12.2(7)DA <ul style="list-style-type: none"> <li>• 18.5 Mbps downstream</li> <li>• 18.5 Mbps upstream</li> </ul>
External interfaces	8 (no connectors on card)
Internal hardware	MPC850 3.3V power 40-MHz CPU
Dimensions	Height: 6.07 in. (15.42 cm) Depth: 8.50 in. (21.59 cm) Width: 0.88 in. (2.24 cm)
Weight	0.70 lb (0.32 kg)
Minimum software and network management requirement	<ul style="list-style-type: none"> <li>• Cisco IOS—Release 12.1(7)DA2</li> <li>• CDM<sup>2</sup>—Release 3.3(3) (optional)</li> </ul>
Minimum software and network management requirement for RADSL <sup>3</sup>	<ul style="list-style-type: none"> <li>• Cisco IOS—Release 12.2(7)DA</li> <li>• CDM—Release 3.4 (optional)</li> </ul>

1. The data rates shown apply to individual cards. System limitations govern actual throughput.

2. CDM = Cisco DSL Manager

3. RADSL = rate adaptive digital subscriber line

# Deployment and Intermixing Guidelines

The Cisco 6015, Cisco 6160, and Cisco 6260 chassis support line card intermixing. The following sections will use the terms *halves* and *quadrants*.

Cisco 6015	First Half	N/A	Slots 1 to 3
	Second Half		Slots 4 to 6
Cisco 6160	First Half	Quadrant 1	Slots 1 to 9
		Quadrant 3	Slots 19 to 27
	Second Half	Quadrant 2	Slots 12 to 18
		Quadrant 4	Slots 28 to 34
Cisco 6260	First Half	Quadrant 1	Slots 1 to 9
		Quadrant 3	Slots 18 to 26
	Second Half	Quadrant 2	Slots 12 to 17
		Quadrant 4	Slots 27 to 32

The Cisco 6015 chassis supports line card intermixing by chassis halves. The following sections detail the deployment guidelines for the 8xG.SHDSL.



Note

For further information about intermixing line cards, refer to the appropriate hardware installation guide.

## Guidelines for Intermixing 8xG.SHDSLs—Cisco IOS Release 12.1(7)DA2, 12.2(1b)DA, and 12.2(5)DA

The Cisco 6160 and Cisco 6260 chassis can be fully populated with 8xG.SHDSLs while retaining Quality of Service (QoS), as long as the upstream bandwidth is provisioned at a maximum of 5 Mbps for even ports and a maximum of 5 Mbps for odd ports per line card. Once an 8xG.SHDSL is installed in a chassis quadrant, no other type of line card can be installed in that same quadrant.



Note

Due to spectral compatibility limitations in the right side configuration of the Cisco 6160 chassis, line card slots 18 and 34 should be configured as specified in [Table 3](#).

## Guidelines for Intermixing 8xG.SHDSLs—Cisco IOS Release 12.2(7)DA and Later

The Cisco 6160 and Cisco 6260 chassis support up to 16 8xG.SHDSLs installed per chassis while retaining QoS. Once an 8xG.SHDSL is installed in a quadrant, no other type of line card can be installed in that same quadrant.



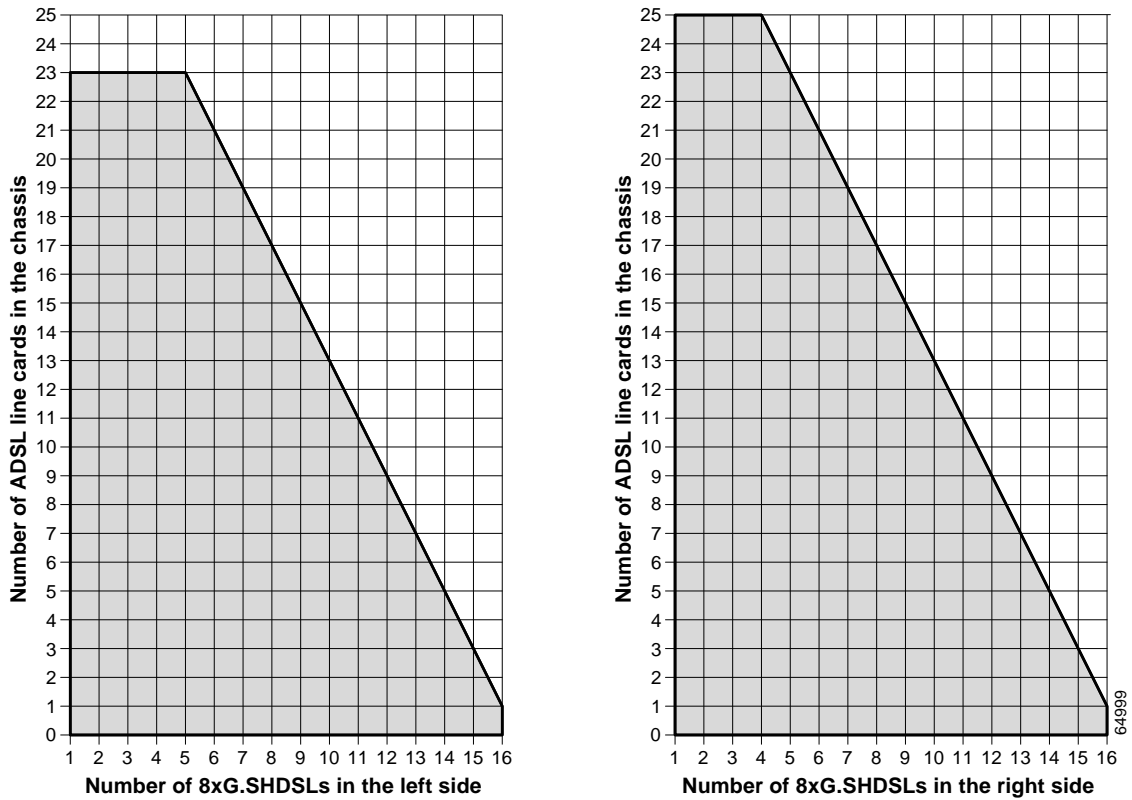
**Note**

Random cell loss may occur if the guidelines for 8xG.SHDSL deployment in a system are exceeded.

Figure 2 illustrates the optimal deployment of 8xG.SHDSLs and quadrant intermixing of ADSL line cards in the Cisco 6160 chassis. For example

- If 4 8xG.SHDSLs are installed in the left side of the chassis, only 23 ADSL line cards can be installed in the remaining quadrants.
- If 4 8xG.SHDSLs are installed in the right side of the chassis, only 25 ADSL line cards can be installed in the remaining chassis quadrants.

**Figure 2** 8xG.SHDSL and ADSL Line Card Intermixing in the Cisco 6160 Chassis



Due to spectral compatibility limitations in the right side configuration of the Cisco 6160 chassis, line card slots 18 and 34 should be configured as specified in Table 3.

**Table 3** Cisco 6160 Right Side Configuration Guidelines

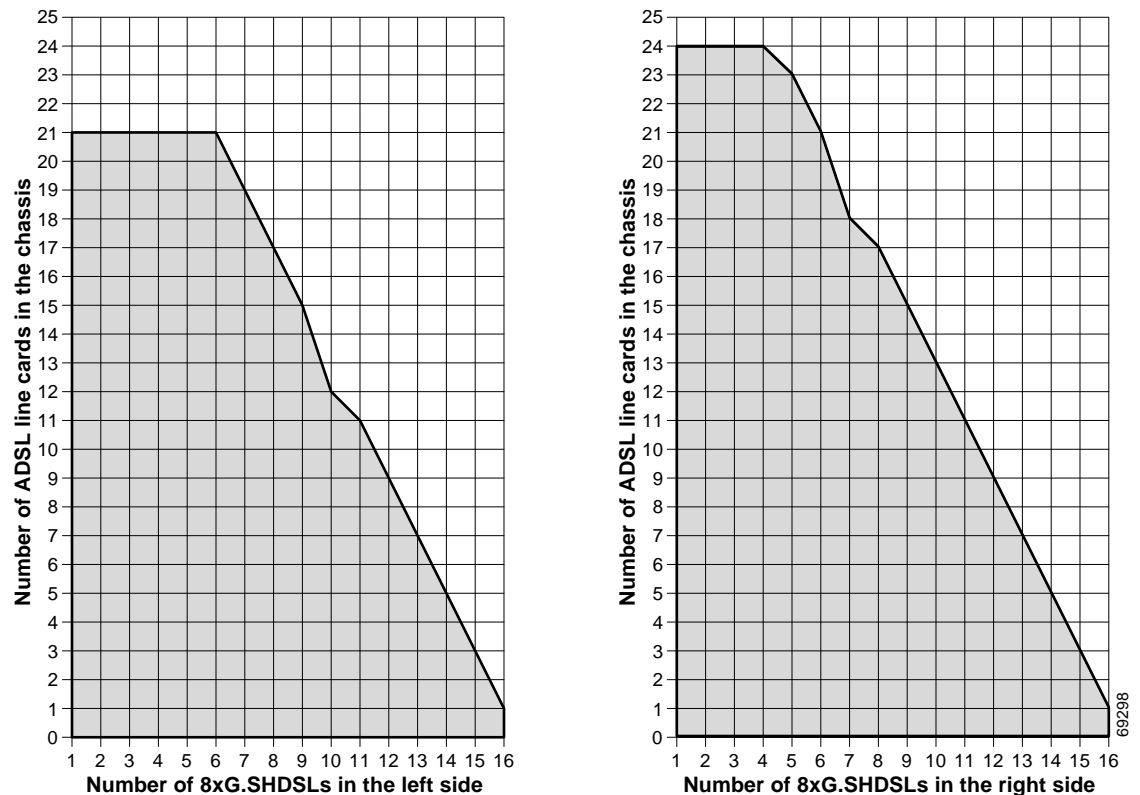
Slot 18	Slot 34	Configuration
8xG.SHDSL	8xG.SHDSL	Supported
8xG.SHDSL	ADSL	Not supported
8xG.SHDSL	Empty	Supported
ADSL	ADSL	Supported

**Table 3** Cisco 6160 Right Side Configuration Guidelines (continued)

Slot 18	Slot 34	Configuration
ADSL	8xG.SHDSL	Not supported
ADSL	Empty	Supported

Figure 3 illustrates the optimal deployment of 8xG.SHDSLs and quadrant intermixing of ADSL line cards in the Cisco 6260 chassis. For example

- If 4 8xG.SHDSLs are installed in the left side of the chassis, only 21 ADSL line cards can be installed in the remaining quadrants.
- If 4 8xG.SHDSLs are installed in the right side of the chassis, only 24 ADSL line cards can be installed in the remaining chassis quadrants.

**Figure 3** 8xG.SHDSL and ADSL Line Card Intermixing in the Cisco 6260 Chassis

## Guidelines for Intermixing 8xG.SHDSLs—Cisco IOS Release 12.2(12)DA and Later for NI2-155SM-155SM2 or NI2-155MM-155MM2 Only

This section describes intermixing in Cisco IOS Release 12.2(12)DA and later for NI2-155SM-155SM2 or NI2-155MM-155MM2 only. All other NI2s, including NI2-155SM-155SM and NI2-155MM-155MM, follow guidelines as described in the [“Guidelines for Intermixing 8xG.SHDSLs—Cisco IOS Release 12.2\(7\)DA and Later”](#) section on page 5.

The Cisco 6015, Cisco 6160, and Cisco 6260 can be fully populated with 8xG.SHDSLs while retaining QoS.

- In the Cisco 6160 and Cisco 6260, once an 8xG.SHDSL is installed in a chassis quadrant, no other type of line card can be installed in that same quadrant.
- In the Cisco 6015, intermixing is limited to chassis halves.

**Note**

In order to provision 18.5 Mbps per line card in a chassis fully populated with 8xG.SHDSLs, an OC-3c/OC-3c single-mode fiber (SMF) or multi-mode fiber (MMF) NI-2 card (NI2-155SM-155SM2 and NI2-155MM-155MM2) must be installed in the chassis.

Due to spectral compatibility limitations in the right side configuration of the Cisco 6160 chassis, line card slots 18 and 34 should be configured as specified in [Table 4](#).

**Table 4** Cisco 6160 Right Side Configuration Guidelines

Slot 18	Slot 34	Configuration
8xG.SHDSL	8xG.SHDSL	Supported
8xG.SHDSL	ADSL	Not supported
8xG.SHDSL	Empty	Supported
ADSL	ADSL	Supported
ADSL	8xG.SHDSL	Not supported
ADSL	Empty	Supported

## Part and Tool Requirements

[Table 5](#) lists the tools and equipment that you need to install and remove an 8xG.SHDSL.

**Table 5** Tool and Equipment Requirements Checklist

Check	Tools and Equipment
	8xG.SHDSL.
	Equipment necessary for ESD protection—You need this equipment whenever you handle Cisco chassis, modules, and cards.
	Flat-head screwdriver.
	Cisco IOS or CDM
	<b>Note</b> See <a href="#">Table 2</a> for minimum software and network management release requirements.

**Note**

The system has no internal user-serviceable parts. However, you can add or remove an 8xG.SHDSL without removing power from the system (hot swapping). See the “[Hot Swapping Line Cards](#)” section on [page 13](#) for more information.



# General Safety Precautions and Maintenance Guidelines

This section describes the following topics:

- [General Safety Precautions, page 9](#)
- [General Maintenance Guidelines, page 13](#)
- [Preventing Electrostatic Discharge Damage, page 14](#)

## General Safety Precautions

Before working on the equipment, be aware of standard safety practices and the hazards involved in working with electrical circuitry to prevent accidents. Adhere to the following cautions and warnings for safe and hazard-free installation.



**Note**

To see translations of the warnings that appear in this publication, refer to the appropriate Regulatory Compliance and Safety Information document for your system.



**Caution**

Before you start the installation procedures, read the entire document for important information and safety warnings.



**Caution**

Proper ESD protection is required whenever you handle Cisco equipment. Installation and maintenance personnel should be properly grounded by means of grounding straps to eliminate the risk of ESD damage to the equipment. Equipment is subject to ESD damage whenever it is removed from the chassis.



**Caution**

If the power connections are improperly connected and power is applied while the cards are installed, the cards and chassis could be damaged.



**Caution**

Service is interrupted only for the subscribers assigned to the line card that is being removed.



**Caution**

It is important that the chassis cooling fans run continuously while the system is powered.



**Caution**

Any card that is only partially connected to the backplane can disrupt system operation.



**Caution**

Installing the line cards in the chassis with the power leads reversed can damage the line cards.



**Warning**

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. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

**Waarschuwing**

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 standaard maatregelen om ongelukken te voorkomen. Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het document *Regulatory Compliance and Safety Information* (Informatie over naleving van veiligheids- en andere voorschriften) raadplegen dat bij dit toestel is ingesloten.

**Varoitus**

Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä julkaisussa esiintyvien varoitusten käännökset löydät laitteen mukana olevasta *Regulatory Compliance and Safety Information* -kirjastesta (määräysten noudattaminen ja tietoa turvallisuudesta).

**Attention**

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d'avertissements figurant dans cette publication, consultez le document *Regulatory Compliance and Safety Information* (Conformité aux règlements et consignes de sécurité) qui accompagne cet appareil.

**Warnung**

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Dokument *Regulatory Compliance and Safety Information* (Informationen zu behördlichen Vorschriften und Sicherheit), das zusammen mit diesem Gerät geliefert wurde.

**Avvertenza**

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nel documento *Regulatory Compliance and Safety Information* (Conformità alle norme e informazioni sulla sicurezza) che accompagna questo dispositivo.

**Advarsel**

Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i dokumentet *Regulatory Compliance and Safety Information* (Overholdelse av forskrifter og sikkerhetsinformasjon) som ble levert med denne enheten.

- Aviso** Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. Para ver as traduções dos avisos que constam desta publicação, consulte o documento *Regulatory Compliance and Safety Information* (Informação de Segurança e Disposições Reguladoras) que acompanha este dispositivo.
- ¡Advertencia!** Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. Para ver una traducción de las advertencias que aparecen en esta publicación, consultar el documento titulado *Regulatory Compliance and Safety Information* (Información sobre seguridad y conformidad con las disposiciones reglamentarias) que se acompaña con este dispositivo.
- Varning!** Denna varningssymbol 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 vanligt förfarande för att förebygga skador. Se förklaringar av de varningar som förkommer i denna publikation i dokumentet *Regulatory Compliance and Safety Information* (Efterrättelse av föreskrifter och säkerhetsinformation), vilket medföljer denna anordning.



Warning

Before opening the chassis, disconnect the telephone-network cables to avoid contact with telephone-network voltages.



Warning

Do not work on the system or connect or disconnect cables during periods of lightning activity.



Warning

Read the installation instructions before you connect the system to its power source.



Warning

This equipment is to be installed and maintained by service personnel only as defined by AS/NZS 3260 Clause 1.2.14.3 Service Personnel.



Warning

This unit is intended for installation in restricted access areas. A restricted access area is where access can only be gained by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.



Warning

To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord.



Warning

During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.



Warning

Use copper conductors only.



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.



Warning

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



Warning

Connect the unit only to DC power source that complies with the Safety Extra-Low Voltage (SELV) requirements in IEC 60950 based safety standards.



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.



Warning

Never install telephone wiring during an electrical storm.



Warning

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



Warning

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



Warning

Use caution when installing or modifying telephone lines.



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.



Warning

Do not use a telephone to report a gas leak in the vicinity of the leak.



Warning

Ultimate disposal of this product should be handled according to all national laws and regulations.



Warning

This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.



Warning

Do not reach into a vacant slot or chassis while you install or remove a line card, module, or a fan. Exposed circuitry could constitute an energy hazard.

## General Maintenance Guidelines

This section provides information on the following topics:

- [Installation and Replacement Suggestions, page 13](#)
- [Hot Swapping Line Cards, page 13](#)

## Installation and Replacement Suggestions

The following examples list recommended installation and replacement practices for the 8xG.SHDSLs.



Caution

Any line card that is only partially connected to the backplane can disrupt system operation.

- Do not force the line card into its slot. This action can damage the pins on the backplane if they are not aligned properly with the line card.
- Ensure that the line card is straight and not at an angle when you install the line card in the slot. Installing the line card at an angle can damage the card. Use the guide rails to install the line card correctly.
- Fully depress the ejector levers to ensure that the card connector mates with the backplane correctly. Firmly seat the line card in the slot.

## Hot Swapping Line Cards

The 8xG.SHDSL can be hot swapped. Hot swapping allows you to remove, replace, and rearrange the line cards without disconnecting the system power. When the system detects that you have added or removed an 8xG.SHDSL, it automatically runs diagnostic and discovery routines and acknowledges the presence or absence of the line card.

If you remove and replace an 8xG.SHDSL with another 8xG.SHDSL, the newly installed line card receives the same provisioning as the original line card. The system resumes operation without any operator intervention.

If an unprovisioned line card is installed for the first time, the system identifies it as present but unprovisioned. Instructions for provisioning the line card are found in the appropriate software guide for your chassis.

## Preventing Electrostatic Discharge Damage

Proper ESD protection is required whenever you handle Cisco equipment. ESD damage, which can occur when electronic cards or components are improperly handled, results in complete or intermittent failures. Use an antistatic strap when you handle any card or component.

Follow these guidelines to prevent ESD damage:

- Always use an ESD ankle or wrist strap and ensure that the wrist strap makes good skin contact.
- Connect the equipment end of the strap to the ESD jack on the front of the chassis.
- When you install a component, use 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 ensure that bus connectors are properly seated.
- When you remove a component, use available ejector levers or captive installation screws to release the bus connectors from the backplane or midplane.
- Avoid touching the printed circuit boards or connectors on the NI-2 cards or line cards.
- 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 protects components from ESD voltages on the body only; ESD voltages on clothing can still cause damage.



**Caution**

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Periodically check the resistance value of the antistatic strap. Ensure that the measurement is between 1 and 10 megohms.

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## Removing and Installing an 8xG.SHDSL

The following describe how to remove or install an 8xG.SHDSL.



**Caution**

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Proper ESD protection is required whenever you handle Cisco equipment. Installation and maintenance personnel should be properly grounded by means of grounding straps to eliminate the risk of ESD damage to the equipment. Equipment is subject to ESD damage whenever it is removed from the chassis.

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**Note**

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All cards must be fully seated in the chassis. Push on the faceplate of each card to be sure that the card is fully seated.

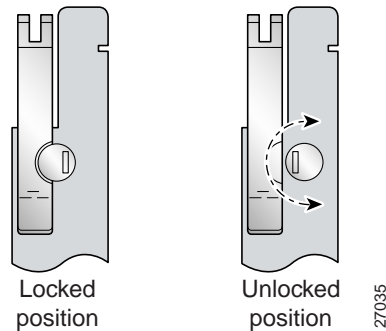
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## Removing an 8xG.SHDSL

Complete the following steps to remove an 8xG.SHDSL from the chassis:

- Step 1** Connect a grounding strap to the ESD grounding jack on the chassis.
- Step 2** Use a flat-head screwdriver to move the locking tab from the locked to the unlocked position. Be sure to turn the locking tab so that it does not overlap the line card ejector lever as shown in [Figure 4](#).

**Figure 4** Positioning the Locking Tab for the 8xG.SHDSL



- Step 3** Lift the ejector lever to disconnect the line card from the backplane.
- Step 4** Carefully slide the line card out of the slot.

Either replace the line card that you remove, or insert a blank faceplate in the empty slot. See the [“Installing an 8xG.SHDSL”](#) section on page 15 for 8xG.SHDSL installation instructions. See the [“Installing a Blank Faceplate”](#) section on page 16 for blank faceplate installation instructions.



**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.**

## Installing an 8xG.SHDSL

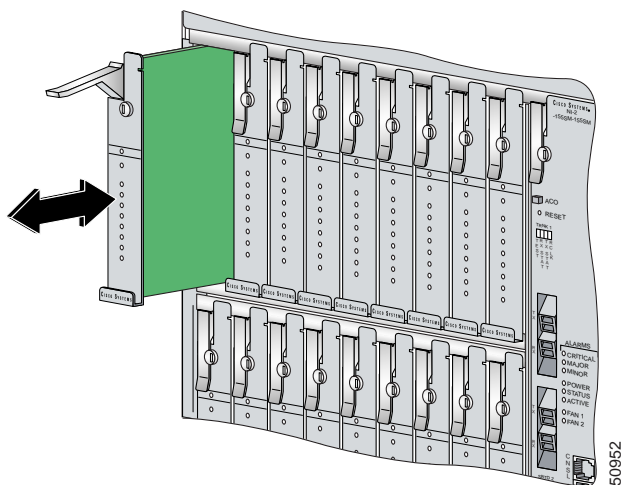
Complete the following steps to install an 8xG.SHDSL in the chassis:

- Step 1** Connect a grounding strap to the ESD grounding jack on the chassis.
- Step 2** Hold the line card horizontally (Cisco 6015) or vertically (Cisco 6160 or Cisco 6260), with the faceplate toward you and the connectors facing the chassis slot.
- Step 3** Align the line card edges with the guides at the left and right (Cisco 6015) or top and bottom (Cisco 6160 or Cisco 6260) of the slot in the chassis.

**Step 4** Lift the ejector lever and gently apply pressure to the faceplate while pushing the line card into the slot.

Figure 5 shows an example of the 8xG.SHDSL installation. The installation procedures will be similar for the other chassis.

*Figure 5 Installation of the 8xG.SHDSL*



- Step 5** Push on the faceplate of the line card to fully seat the card.
- Step 6** Press down on the ejector lever to secure the line card and connect it to the backplane.
- Step 7** Use a flat-head screwdriver to turn the locking tab so that it overlaps the line card ejector lever to prevent inadvertent dislodging. Figure 4 shows how to position the locking tabs.
- Step 8** Verify that the STATUS LED is solid green after the brief self-test. If the STATUS LED is not green after the self-test, see the appropriate hardware guide for your chassis for troubleshooting procedures.



**Note** If you are installing the line card for the first time, refer to the provisioning procedures in the appropriate software guide for your chassis.

## Installing a Blank Faceplate

Complete the following steps to install a blank faceplate in the chassis:



**Note** Blank faceplates should occupy any empty line card slots in the chassis. The blank faceplate installation is similar to the line card installation.

- Step 1** Connect a grounding strap to the ESD grounding jack.
- Step 2** Align the blank faceplate edges with the slot guides in the chassis.
- Step 3** Lift the ejector lever and gently apply pressure to the faceplate while pushing the blank faceplate into the slot.



- Step 4** Push on the faceplate to fully seat the blank faceplate.
- Step 5** Press down on the ejector lever to secure the faceplate.
- 

## Traffic Handling

The 8xG.SHDSL supports multiple line rates ranging from 72 kbps to 2312 kbps in fixed mode. In rate adaptive mode, the 8xG.SHDSL supports rates ranging from 2312 kbps to 200 kbps in 64 kbps decrements. In rate adaptive mode, line rate is negotiated and then locked when the line trains. [Table 6](#) shows the line rates that the 8xG.SHDSL supports in fixed mode.

**Table 6** 8xG.SHDSL Fixed Mode Line Rates

Line-Encoding Type	Line Rates (kbps)
TC-PAM	72
	136
	200
	264
	392
	520
	776
	1032
	1160
	1544
	2056
	2312



**Note**

The maximum data rate for the 8xG.SHDSL is equal to the line rate minus 8 Kbps.

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# Standards and Certifications

Table 7 lists 8xG.SHDSL standards and certifications.

*Table 7 8xG.SHDSL Standards and Certifications*

Discipline	Compliance Standard
Product Safety	UL 1950, 3rd Edition EN60950 2nd Edition, Amendments 1, 2, 3, 4, 11 IEC 2nd Edition, Amendments 1, 2, 3, 4 AS/NZS 3260
EMI	EN55022/CISPR22 FCC Part 15 AS/ANS 3548 ICCS-03 VCCI BSMI (CNS 13438)
Immunity	EN/IEC 61000-4-2, 3, 4, 5, 6
NEBS	GR-63-CORE GR-108-CORE SR-3580 Level 3
ETSI	EN/ETSI 300-386.1, 300-386.2
Telecom	China, BSMI ICCS-03 Australia, AS/ACIF S043.2.200

## Related Documentation

A complete list of all DSL product related documentation is available on the World Wide Web at [http://www.cisco.com/univercd/cc/td/doc/product/dsl\\_prod/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/dsl_prod/index.htm)

## Obtaining Documentation

The following sections explain how to obtain documentation from Cisco Systems.

### World Wide Web

You can access the most current Cisco documentation on the World Wide Web at the following URL:

<http://www.cisco.com>

Translated documentation is available at the following URL:

[http://www.cisco.com/public/countries\\_languages.shtml](http://www.cisco.com/public/countries_languages.shtml)

## Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which is shipped with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual subscription. Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:

<http://www.cisco.com/go/subscription>

## Documentation Feedback

If you are reading Cisco product documentation on Cisco.com, you can submit technical comments electronically. Click **Leave Feedback** at the bottom of the Cisco Documentation home page. After you complete the form, print it out and fax it to Cisco at 408 527-0730.

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To submit your comments by mail, write to the following address:

Cisco Systems  
Attn: Document Resource Connection  
170 West Tasman Drive  
San Jose, CA 95134-9883

We appreciate your comments.

## Obtaining Technical Assistance

Cisco provides Cisco.com as a starting point for all technical assistance. Customers and partners can obtain documentation, troubleshooting tips, and sample configurations from online tools by using the Cisco Technical Assistance Center (TAC) Web Site. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC Web Site.

## Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com is a highly integrated Internet application and a powerful, easy-to-use tool that provides a broad range of features and services to help you to

- Streamline business processes and improve productivity
- Resolve technical issues with online support
- Download and test software packages
- Order Cisco learning materials and merchandise
- Register for online skill assessment, training, and certification programs

You can self-register on Cisco.com to obtain customized information and service. To access Cisco.com, go to the following URL:

<http://www.cisco.com>

## Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two types of support are available through the Cisco TAC: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Inquiries to Cisco TAC are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

Which Cisco TAC resource you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

### Cisco TAC Web Site

The Cisco TAC Web Site allows you to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to the following URL:

<http://www.cisco.com/tac>

All customers, partners, and resellers who have a valid Cisco services contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to the following URL to register:

<http://www.cisco.com/register/>

If you cannot resolve your technical issues by using the Cisco TAC Web Site, and you are a Cisco.com registered user, you can open a case online by using the TAC Case Open tool at the following URL:

<http://www.cisco.com/tac/caseopen>

If you have Internet access, it is recommended that you open P3 and P4 cases through the Cisco TAC Web Site.

### Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses issues that are classified as priority level 1 or priority level 2; these classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer will automatically open a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to the following URL:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled; for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). In addition, please have available your service agreement number and your product serial number.

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This document is to be used in conjunction with the documents listed in the “[Related Documentation](#)” section.

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