CISCO SYSTEMS

Catalyst 2950 Switch
Hardware Installation Guide

August 2004

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Cisco Limited Lifetime Hardware Warranty Terms

There are special terms applicable to your hardware warranty and various services that you can use during the warranty period. Follow these steps to access and download the *Cisco Information Packet* and your warranty document from Cisco.com.

1. Launch your browser, and go to this URL:

   http://www.cisco.com/univercd/cc/td/doc/es_inpck/cetrans.htm

   The Warranties and License Agreements page appears.

2. To read the *Cisco Information Packet*, follow these steps:

   a. Click the **Information Packet Number** field, and make sure that the part number 78-5235-02F0 is highlighted.

   b. Select the language in which you would like to read the document.

   c. Click **Go**.

      The Cisco Limited Warranty and Software License page from the Information Packet appears.

   d. Read the document online, or click the **PDF** icon to download and print the document in Adobe Portable Document Format (PDF).

      > **Note** You must have Adobe Acrobat Reader to view and print PDF files. You can download the reader from Adobe's website: http://www.adobe.com

3. To read translated and localized warranty information about your product, follow these steps:

   a. Enter this part number in the Warranty Document Number field:

      78-6310-02C0

   b. Select the language in which you would like to view the document.

   c. Click **Go**.

      The Cisco warranty page appears.

   d. Read the document online, or click the **PDF** icon to download and print the document in Adobe Portable Document Format (PDF).

You can also contact the Cisco service and support website for assistance:

http://www.cisco.com/public/Support_root.shtml.

Duration of Hardware Warranty

A Cisco product hardware warranty is supported for as long as the original end user continues to own or use the product, provided that the fan and power supply warranty is limited to five (5) years. In the event of a discontinuance of product manufacture, the Cisco warranty support is limited to five (5) years from the announcement of the discontinuance.

Replacement, Repair, or Refund Policy for Hardware

Cisco or its service center will use commercially reasonable efforts to ship a replacement part within ten (10) working days after receipt of the Return Materials Authorization (RMA) request. Actual delivery times can vary, depending on the customer location.

Cisco reserves the right to refund the purchase price as its exclusive warranty remedy.

To Receive a Return Materials Authorization (RMA) Number

Contact the company from whom you purchased the product. If you purchased the product directly from Cisco, contact your Cisco Sales and Service Representative.

Complete the information below, and keep it for reference.

Company product purchased from	
Company telephone number	
Product model number	
Product serial number	
Maintenance contract number	

Preface

Audience

This guide is for the networking or computer technician responsible for installing a Catalyst 2950 switch, hereafter referred to as the *switch*. We assume that you are familiar with the concepts and terminology of Ethernet and local area networking.

Purpose

This guide describes the hardware features of the Catalyst 2950 switch. It describes the physical and performance characteristics of the switch, explains how to install a switch, and provides troubleshooting information and specifications.

This guide does not describe how to configure software features on your switch or describe the Catalyst 2950-specific system messages that you might encounter. It also does not provide information about command-line interface (CLI) commands that have been created or changed for use by the switch. For more information, see the switch software configuration guide, the switch system message guide, and the switch command reference.

Conventions

Command descriptions use these conventions:

- Commands and keywords are in **boldface** text.
- Arguments for which you supply values are in *italic*.
- Square brackets ([ ]) mean optional elements.
- Braces ({ }) group required choices, and vertical bars (|) separate the alternative elements.
- Braces and vertical bars within square brackets ([{ | }]) mean a required choice within an optional element.

Notes, cautions, and warnings use these conventions and symbols:

Note Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

⚠

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

⚠

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 zusammmen 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

Figyelem **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

警告 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 أخر 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**

Related Publications

These documents provide complete information about the switch and are available from this URL:

http://www.cisco.com/univercd/cc/td/doc/product/lan/cat2950/index.htm

You can order printed copies of documents with a DOC-xxxxxx= number from the Cisco.com sites and from the telephone numbers listed in the "Ordering Documentation" section on page xvii.

- *Release Notes for the Catalyst 2950 and Catalyst 2955 Switches* (not orderable but available on Cisco.com)

- *Release Notes for the Catalyst 2950 LRE Switches* (not orderable but available on Cisco.com)

> **Note** Switch requirements and procedures for initial configurations and software upgrades tend to change and therefore appear only in the release notes. Before installing, configuring, or upgrading the switch, see the release notes on Cisco.com for the latest information.

For hardware information about the switch, see these documents:

- *Catalyst 2950 Switch Hardware Installation Guide* (not orderable but available on Cisco.com)

- *Catalyst 2950 Switch Getting Started Guide*
  (order number DOC-7816521=)

- *Regulatory Compliance and Safety Information for the Catalyst 2950 Switch*
  (order number DOC-786625=

For software information about the switch, see these documents:

- *Catalyst 2950 and Catalyst 2955 Switch Software Configuration Guide* (order number DOC-7811380=)

- *Catalyst 2950 and Catalyst 2955 Switch Command Reference* (order number DOC-7811381=)

- *Catalyst 2950 and Catalyst 2955 Switch System Message Guide* (order number DOC-7814233=)

For information about the Catalyst 2950 Long-Reach Ethernet (LRE) switches, see these documents:

- *Catalyst 2950 Switch Software Configuration Guide* (order number DOC-7814982=)

- *Catalyst 2950 Switch Command Reference* (order number DOC-7814984=)

- *Catalyst 2950 Switch System Message Guide (*order number DOC-7814981=)

- R*elease Notes for the Catalyst 2950 LRE Switch* (not orderable but available on Cisco.com)

For other information about related products, see these documents:

- *1000BASE-T Gigabit Interface Converter Installation Notes* (not orderable but available on Cisco.com)

- *Catalyst GigaStack Gigabit Interface Converter Hardware Installation Guide* (order number DOC-786460=)

- *Cisco LRE CPE Hardware Installation Guide* (order number DOC-7811469=)

- *Cisco RPS 300 Redundant Power System Hardware Installation Guide* (order number DOC-7810372=)

- *Cisco RPS 675 Redundant Power System Hardware Installation Guide* (order number DOC-7815201=)

- Device manager online help (available on the switch)

- *Getting Started with Cisco Network Assistant* (not orderable but available on Cisco.com)

- *Course Wave Division Multiplexer (CWDM) Passive Optical System Installation Note* (not orderable but available on Cisco.com)

- Cisco Small Form-Factor Pluggable Modules Installation Notes (order number DOC-7815160=)

- *Compatibility Matrix for 1000BASE-T Small Form-Factor Pluggable Modules* (not orderable but available on Cisco.com)

- Compatibility Matrix for Small Form-Factor Pluggable Modules (not orderable but available on Cisco.com)

- *Installation and Warranty Notes for the Cisco LRE 48 POTS Splitter* (order number DOC-7812250=)

- *Installation Notes for Wall-Mount Brackets* (order number DOC-7813035=)

Obtaining Documentation

Cisco provides several ways to obtain documentation, technical assistance, and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

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

http://www.cisco.com/univercd/home/home.htm

You can access the Cisco website at this URL:

http://www.cisco.com

International Cisco websites can be accessed from this URL:

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 may have shipped with your product. The Documentation CD-ROM is updated regularly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual or quarterly subscription.

Registered Cisco.com users can order a single Documentation CD-ROM (product number DOC-CONDOCCD=) through the Cisco Ordering tool:

http://www.cisco.com/en/US/partner/ordering/ordering_place_order_ordering_tool_launch.html

All users can order annual or quarterly subscriptions through the online Subscription Store:

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

Ordering Documentation

You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpck/pdi.htm

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Networking Products MarketPlace:

  http://www.cisco.com/en/US/partner/ordering/index.shtml

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, USA.) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

You can submit comments electronically on Cisco.com. On the Cisco Documentation home page, click **Feedback** at the top of the page.

You can send your comments in e-mail to bug-doc@cisco.com.

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

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

We appreciate your comments.

Obtaining Technical Assistance

For all customers, partners, resellers, and distributors who hold valid Cisco service contracts, the Cisco Technical Assistance Center (TAC) provides 24-hour, award-winning technical support services, online and over the phone. Cisco.com features the Cisco TAC website as an online starting point for technical assistance.

Cisco TAC Website

The Cisco TAC website (http://www.cisco.com/tac) provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The Cisco TAC website is available 24 hours a day, 365 days a year.

Accessing all the tools on the Cisco TAC website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a login ID or password, register at this URL:

http://tools.cisco.com/RPF/register/register.do

Opening a TAC Case

The online TAC Case Open Tool (http://www.cisco.com/tac/caseopen) is the fastest way to open P3 and P4 cases. (Your network is minimally impaired or you require product information). After you describe your situation, the TAC Case Open Tool automatically recommends resources for an immediate solution. If your issue is not resolved using these recommendations, your case will be assigned to a Cisco TAC engineer.

For P1 or P2 cases (your production network is down or severely degraded) or if you do not have Internet access, contact Cisco TAC by telephone. Cisco TAC engineers are assigned immediately to P1 and P2 cases to help keep your business operations running smoothly.

To open a case by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553-2447

For a complete listing of Cisco TAC contacts, go to this URL:

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

TAC Case Priority Definitions

To ensure that all cases are reported in a standard format, Cisco has established case priority definitions.

Priority 1 (P1)—Your network is "down" or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Priority 2 (P2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Priority 3 (P3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Priority 4 (P4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- The *Cisco Product Catalog* describes the networking products offered by Cisco Systems, as well as ordering and customer support services. Access the *Cisco Product Catalog* at this URL:

  http://www.cisco.com/en/US/products/products_catalog_links_launch.html

- Cisco Press publishes a wide range of networking publications. Cisco suggests these titles for new and experienced users: Internetworking Terms and Acronyms Dictionary, Internetworking Technology Handbook, Internetworking Troubleshooting Guide, and the Internetworking Design Guide. For current Cisco Press titles and other information, go to Cisco Press online at this URL:

  http://www.ciscopress.com

- Packet magazine is the Cisco quarterly publication that provides the latest networking trends, technology breakthroughs, and Cisco products and solutions to help industry professionals get the most from their networking investment. Included are networking deployment and troubleshooting tips, configuration examples, customer case studies, tutorials and training, certification information, and links to numerous in-depth online resources. You can access Packet magazine at this URL:

  http://www.cisco.com/go/packet

- iQ Magazine is the Cisco bimonthly publication that delivers the latest information about Internet business strategies for executives. You can access iQ Magazine at this URL:

  http://www.cisco.com/go/iqmagazine

- Internet Protocol Journal is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

  http://www.cisco.com/en/US/about/ac123/ac147/about_cisco_the_internet_protocol_journal.html

- Training—Cisco offers world-class networking training. Current offerings in network training are listed at this URL:

  http://www.cisco.com/en/US/learning/index.html

Overview

This chapter provides information about these topics:

Setting up the Switch

See the *Catalyst 2950 Switch Getting Started Guide* for instructions on initially configuring your Catalyst switch by using the Express Setup. Also covered in the getting started guide are switch management options, basic rack-mounting procedures, port and module connections, power connection procedures for both AC- and DC-powered switches, and troubleshooting help.

For instructions on setting up your switch by using the command-line interface (CLI), see Appendix D, "Configuring the Switch with the CLI-Based Setup Program."

Features

The Catalyst 2950 switches are a family of Ethernet switches that you can use to connect workstations and other network devices, such as servers, routers, and other switches. All models of the switch are cluster-capable, but only some models are stackable. You can use switches with gigabit interface converter (GBIC) module slots to create switch stacks by using Gigastack GBICs. Some switch models can be deployed as backbone switches, aggregating 10BASE-T, 100BASE-TX, Gigabit Ethernet, and Long-Reach Ethernet (LRE) traffic from other switches and network devices. See the switch software configuration guide for examples that show how you might deploy the switches in your network.

Figure 1-1 through Figure 1-12 show the Catalyst 2950 switches.

These are the switch features:

- Hardware

    - Catalyst 2950-12 switch—12 10/100 Ethernet ports

    - Catalyst 2950-24 switch—24 10/100 Ethernet ports

    - Catalyst 2950C-24 switch—24 10/100 Ethernet ports and 2 100BASE-FX ports

- Catalyst 2950G-12-EI—12 10/100 Ethernet ports and 2 GBIC module slots

- Catalyst 2950G-24-EI—24 10/100 Ethernet ports and 2 GBIC module slots

- Catalyst 2950G-24-EI-DC—24 10/100 Ethernet ports and 2 GBIC module slots with DC-input power

- Catalyst 2950G-48-EI—48 10/100 Ethernet ports and 2 GBIC module slots

- Catalyst 2950ST-8 LRE switch—8 LRE ports, 2 10/100/1000 Ethernet ports, and 2 small-form-factor pluggable (SFP) module slots. (Two of the four uplink ports are active at one time.)

- Catalyst 2950ST-24 LRE switch—24 LRE ports, 2 10/100/1000 Ethernet ports, and 2 SFP module slots. (Two of the four uplink ports are active at one time.)

- Catalyst 2950ST-24 LRE 997 switch—24 LRE ports, 2 10/100/1000 Ethernet ports, and 2 SFP module slots with DC-input power. (Two of the four uplink ports are active at one time.)

> **Note** See the Catalyst 2950 LRE switch release notes for a list of supported SFP modules for the Catalyst 2950 LRE switches.

- Catalyst 2950SX-24 switch—24 10/100 Ethernet ports and 2 1000BASE-SX ports

- Catalyst 2950T-24 switch—24 10/100 Ethernet ports and 2 10/100/1000 Ethernet ports

- Catalyst 2950SX-48-SI switch—48 10/100 Ethernet ports and 2 1000BASE-SX ports

- Catalyst 2950T-48-SI switch—48 10/100 Ethernet ports and 2 10/100/1000 Ethernet ports

- On Catalyst 2950G-12-EI, 2950G-24-EI, 2950G-24-EI-DC, and 2950G-48-EI switches, support for these GBIC modules:

  1000BASE-SX GBIC

  1000BASE-LX/LH GBIC

  1000BASE-ZX GBIC

  1000BASE-T GBIC (model WS-5483)

  Coarse Wave Division Multiplexer (CWDM) fiber-optic GBIC

  GigaStack GBIC

- Configuration

  - For 10/100 ports, autonegotiates the speed and duplex settings

  - For 10/100/1000 ports on the Catalyst 2950T-24 switch, autonegotiates the speed and supports only full-duplex mode

  - For 10/100/1000 ports on the Catalyst 2950T-48-SI and 2950 LRE switches, autonegotiates the speed and duplex setting when operating at 10 or 100 Mbps. When the switch is running at 1000 Mbps, it supports only full-duplex mode.

  - For 100BASE-FX ports, supports only 100-Mbps and full-duplex settings

  - For 1000BASE-SX ports, supports only 1000-Mbps and full-duplex settings

  - Supports 8192 MAC addresses

  - Checks for errors on a received packet, determines the destination port, stores the packet in shared memory, and then forwards the packet to the destination port

- Power redundancy
  - Connection for an optional Cisco RPS 300 redundant power system (RPS) that uses AC input and supplies DC output to the switch
  - Connection for an optional Cisco RPS 675 that uses AC input and supplies DC output to the switch

Certain Cisco LRE customer premises equipment (CPE) devices are not supported by certain Catalyst 2950 LRE switches. In Table 1-1, *Yes* means that the CPE is supported by the switch; *No* means that the CPE is not supported by the switch.

Table 1-1   LRE Switch and CPE Compatibility Matrix

LRE Devices	Catalyst 2950ST-8 LRE	Catalyst 2950ST-24 LRE	Catalyst 2950ST-24 LRE 997
Cisco 575 LRE CPE	Yes	Yes	No
Cisco 576 LRE 997 CPE	No	No	Yes
Cisco 585 LRE CPE	Yes	Yes	No

Front-Panel Description

The switch front panel contains the ports, the LEDs, and the Mode button.

Other than the Catalyst 2950ST-24 LRE 997 switch, the front panel of the Catalyst 2950 LRE switches also contain the console port and AC power connector. On the Catalyst 2950ST-24 LRE 997 switch, the front panel contains a DC power connector (also referred to as the terminal block header), a DC ground lug, and an RJ-45 console port.

For more information about the power connectors on the LRE switches, see the "Power Connectors" section on page 1-22. For more information on the console port on these switches, see the "Console Port" section on page 1-24.

Figure 1-1 to Figure 1-12 show the switches.

Figure 1-1   Catalyst 2950-12 Switch

10/100 ports
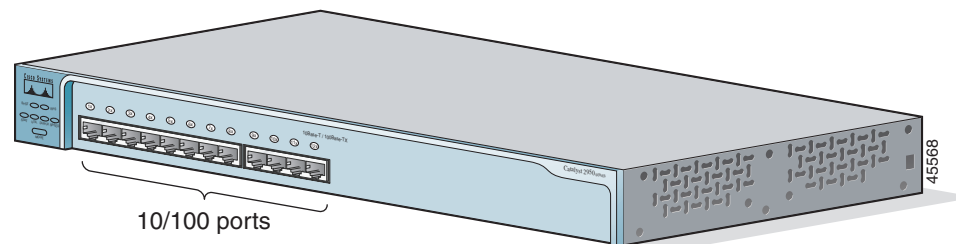
Figure 1-2   Catalyst 2950-24 Switch

10/100 ports
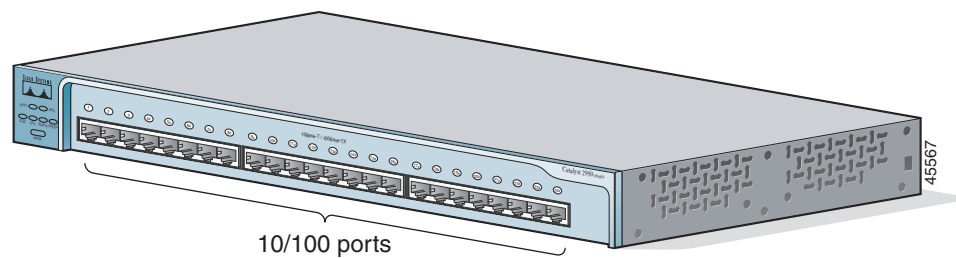
Figure 1-3   Catalyst 2950C-24 Switch

10/100 ports

100BASE-FX ports
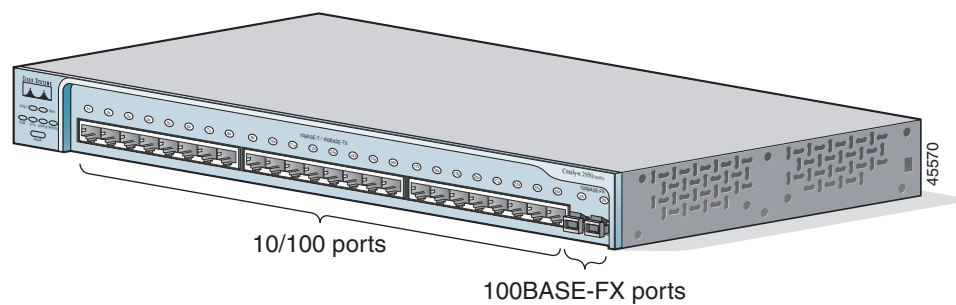
Figure 1-4   Catalyst 2950G-12-EI Switch

10/100 ports

GBIC module
slots
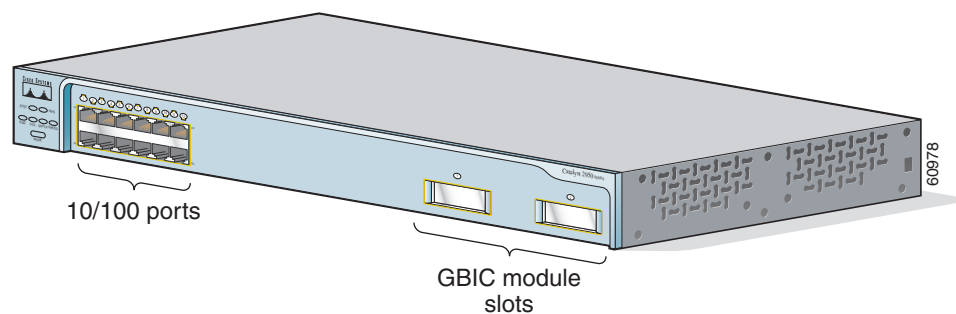
Figure 1-5   Catalyst 2950G-24-EI Switch

10/100 ports

GBIC module
slots
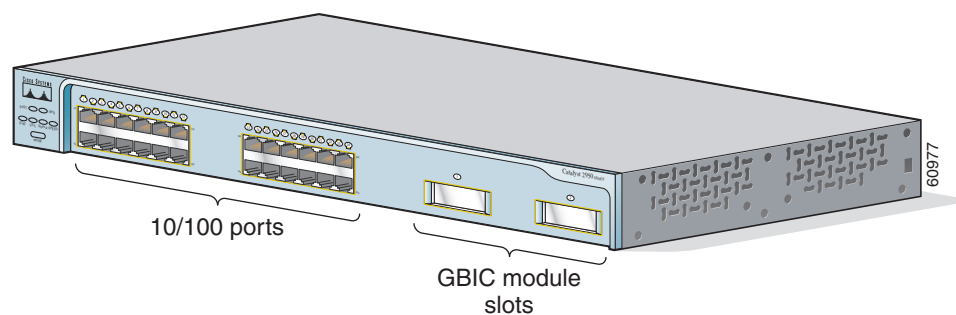
Figure 1-6   Catalyst 2950G-24-EI-DC Switch

10/100 ports

GBIC module
slots
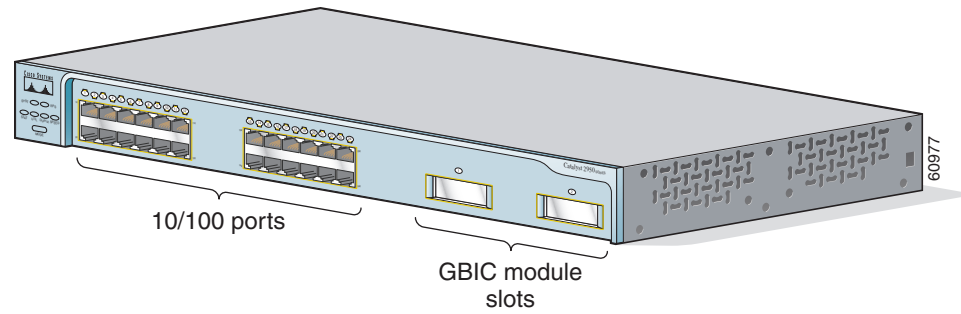
Figure 1-7   Catalyst 2950G-48-EI Switch

10/100 ports

GBIC module
slots
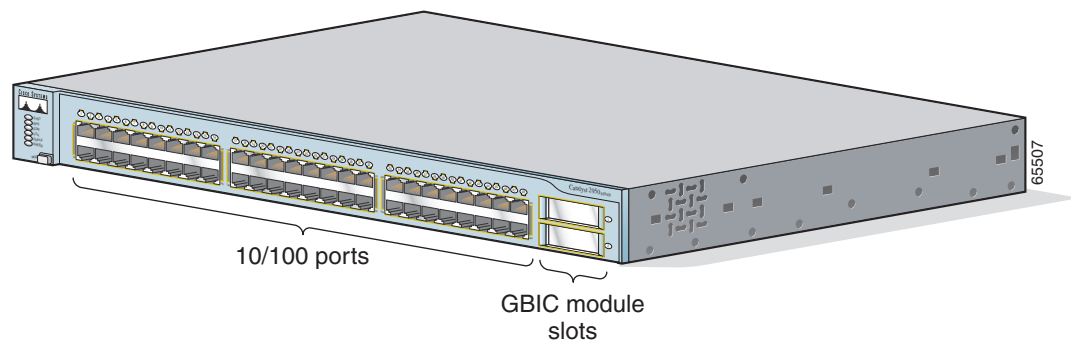
Figure 1-8   Catalyst 2950ST-8 LRE Switch

Power
connector

LRE
port

SFP
ports

Console
port

10/100/1000
ports
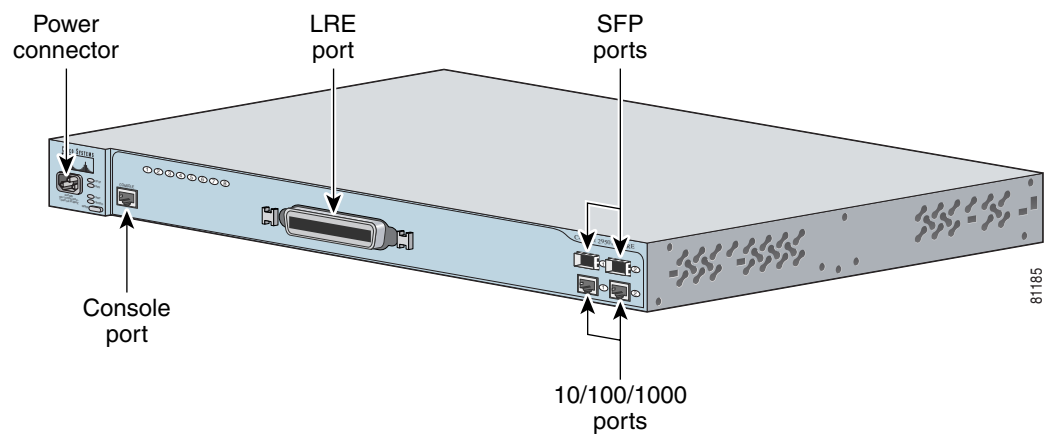
Figure 1-9   Catalyst 2950ST-24 LRE Switch
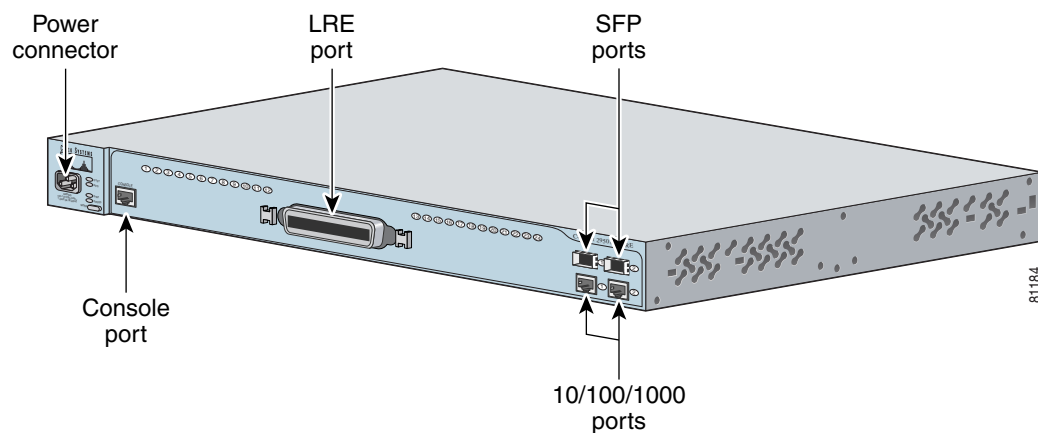
Figure 1-10   Catalyst 2950ST-24 LRE 997 Switch
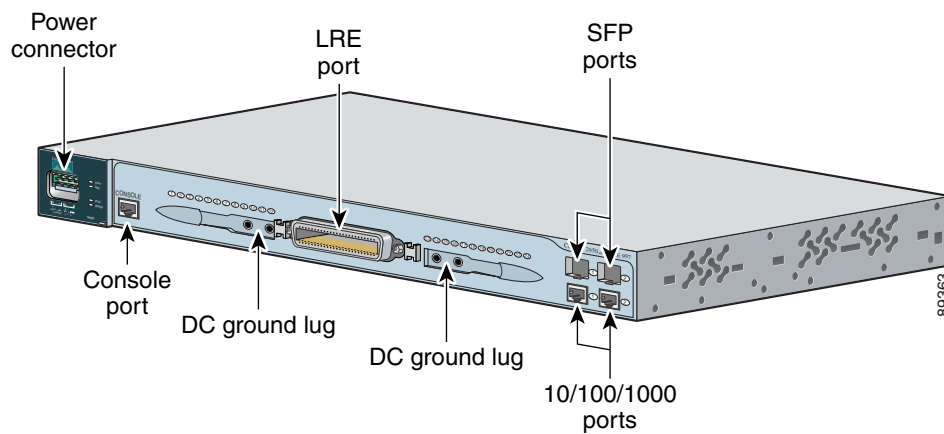
Figure 1-11   Catalyst 2950SX-24 Switch
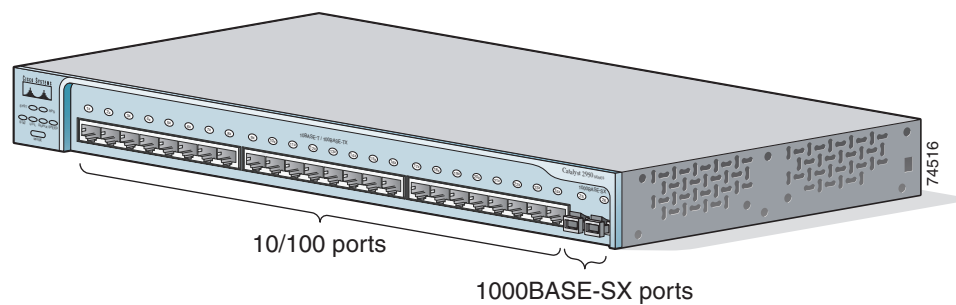
Figure 1-12   Catalyst 2950T-24 Switch

10/100 ports
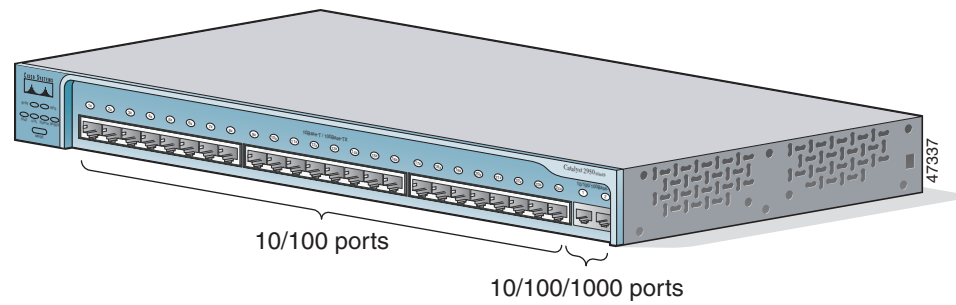
10/100/1000 ports

Figure 1-13   Catalyst 2950SX-48-SI Switch

10/100 ports

1000BASE-SX ports
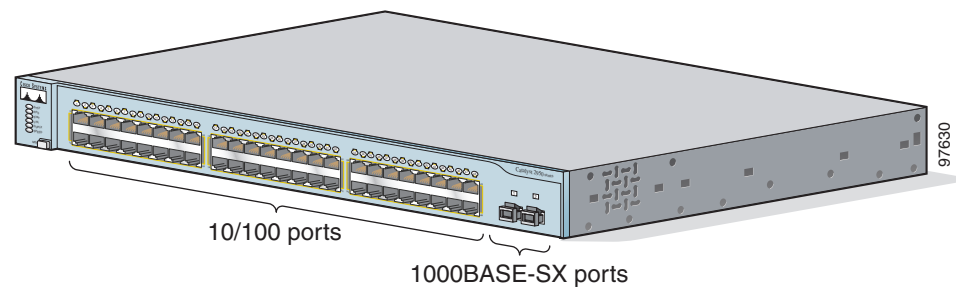
Figure 1-14   Catalyst 2950T-48-SI Switch

10/100 ports
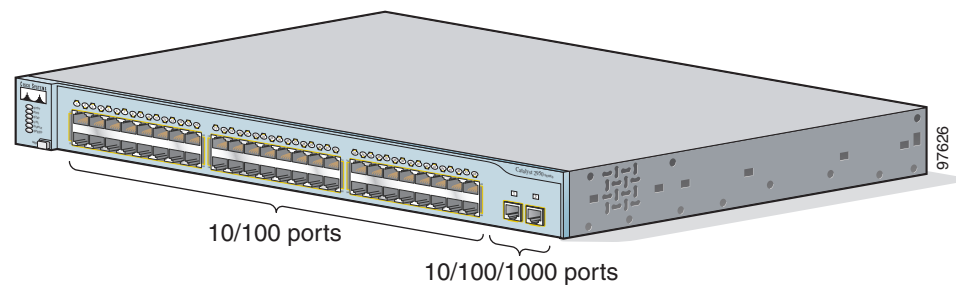
10/100/1000 ports

10/100 Ports

The 10/100 ports use RJ-45 connectors and twisted-pair cabling. The ports can connect to these devices:

- 10BASE-T devices, such as workstations and hubs, through standard RJ-45 connectors and two twisted-pair cabling. You can use Category 3, 4, or 5 cabling.

- 100BASE-TX devices, such as high-speed workstations, servers, hubs, routers, and other switches, through standard RJ-45 connectors and two or four twisted-pair, Category 5 cabling.

> ✎
>
> **Note**   When connecting the switch to workstations, servers, and routers, be sure that the cable is a twisted-pair straight-through cable. When connecting the switch to hubs or other switches, use a twisted-pair crossover cable. Pinouts for the cables are described in Appendix B, "Connectors and Cables."
>
>   For information on how to identify a crossover cable, go to the "Identifying a Crossover Cable" section on page B-5.

The 10/100 ports can be explicitly set to operate in any combination of half duplex, full duplex, 10 Mbps, or 100 Mbps. They can also be set for speed and duplex autonegotiation, compliant with IEEE 802.3U. In all cases, the cable length from a switch to an attached device cannot exceed 328 feet (100 meters).

When set for autonegotiation, a port senses the speed and duplex settings of the attached device and advertises its own capabilities. If the attached device supports autonegotiation, the 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.

10/100/1000 Ports

The 10/100/1000 ports on Catalyst 2950T-24, Catalyst 2950T-48-SI, and Catalyst 2950 LRE switches use RJ-45 connectors and twisted-pair cabling. The ports can connect to these devices:

- 10BASE-T devices, such as workstations and hubs, through standard RJ-45 connectors and two or four twisted-pair, Category 5 cabling.
- 100BASE-TX devices, such as high-speed workstations, servers, hubs, routers, and other switches, through standard RJ-45 connectors and two or four twisted-pair, Category 5 cabling.
- 1000BASE-T devices, such as high-speed workstations, servers, hubs, routers, and other switches, through standard RJ-45 connectors and four twisted-pair, Category 5 cabling.

> ✎
>
> **Note**   When connecting the switch to a 1000BASE-T device, be sure to use a four twisted-pair, Category 5 cable.

> ✎
>
> **Note**   When connecting the switch to workstations, servers, and routers, be sure to use a twisted-pair straight-through cable. When connecting the switch to hubs or other switches, use a twisted-pair crossover cable. Pinouts for the cables are described in Appendix B, "Connectors and Cables."
>
>   For information on how to identify a crossover cable, go to the "Identifying a Crossover Cable" section on page B-5.

The 10/100/1000 ports on the Catalyst 2950T-24 switch can be explicitly set to operate at 10, 100, or 1000 Mbps, but only in full-duplex mode. The 10/100/1000 ports on the Catalyst 2950T-48-SI and Catalyst 2950 LRE switches can be explicitly set to operate at 10 or 100 Mbps in full- or half-duplex mode or at 1000 Mbps in full-duplex mode.

The 10/100/1000 ports can also be set for speed autonegotiation, compliant with IEEE 802.3AB. In all cases, the cable length from a switch to an attached device cannot exceed 328 feet (100 meters).

> **Note**   On the Catalyst 2950 LRE switches, the four input uplink ports are bundled as two logical ports, each consisting of a copper 10/100/1000 port and a fiber-optic SFP module slot, respectively.
>
> Within each logical port, you can use only the copper or the fiber-optic port at one time. If a Catalyst 2950 LRE switch senses more than two connections for both logical ports, the switch chooses the fiber-optic connections over the copper connections in default operation.
>
> See the "SFP Module Slots" section on page 1-11 for more information on LRE uplink logical ports.

100BASE-FX and 1000BASE-SX Ports

The 100BASE-FX and 1000BASE-SX ports both use 50/125- or 62.5/125-micron multimode fiber-optic cabling. The 100BASE-FX ports operate only at 100 Mbps in full-duplex mode, and the 1000BASE-SX ports operate only at 1000 Mbps in full-duplex mode.

In full-duplex mode, the cable length from a 100BASE-FX port on a switch to an attached device cannot exceed 6562 feet (2 kilometers). The cable length from a 1000BASE-SX port on a switch to an attached device cannot exceed 1804 feet (550 meters).

You can connect a 100BASE-FX or 1000BASE-SX port to an SC or ST port on a target device by using one of the MT-RJ fiber-optic patch cables listed in Table 2-1 on page 2-29. Use the Cisco part numbers in Table 2-1 to order the patch cables that you need.

LRE Port

The LRE port (shown in Figure 1-8) uses one RJ-21 connector to connect up to 24 Cisco LRE CPE devices through structured or unstructured wiring, such as existing telephone lines. The link between the LRE switch port and each CPE device can reach speeds of up to 15 Mbps (full duplex) over distances of up to 4921 feet (1500 meters).

Certain Catalyst 2950 LRE switches support certain Cisco LRE CPE devices. Table 1-1 on page 1-3 shows which LRE switches support which CPE devices.

You can connect the Cisco 575 LRE CPE and Cisco 585 LRE CPE devices to LRE ports on the same Catalyst 2950ST-8 LRE or 2950ST-24 LRE switch. You can connect the Cisco 576 LRE CPE 997 device only to LRE ports on a Catalyst 2950ST-24 LRE 997 switch. You can hot swap the CPE devices without powering down the switch or disrupting the other switch ports.

The default mode for each LRE port is speed autosensing and half-duplex operation. For information about configuring the LRE ports, see the switch software configuration guide.

If telephone services, such as voice or an Integrated Services Digital Network (ISDN), use the same cabling as LRE traffic, the LRE port must be connected to the patch panel through a *plain old telephone service (*POTS) splitter. The splitter routes LRE data (high-frequency) and voice (low-frequency) traffic from the telephone line to the switch and private branch exchange (PBX) switch or public switched telephone network (PSTN).

If the other telephone services are connected through a PBX switch, a non-homologated POTS splitter, such as the Cisco LRE 48 POTS Splitter, can be used. The PBX routes voice traffic to private telephone networks and the PSTN. For more information about the Cisco LRE 48 POTS Splitter (PS-1M-LRE-48), see the *Installation and Warranty Notes for the Cisco LRE 48 POTS Splitter.*

For limitations and restrictions when you use a POTS splitter with the Catalyst 2950 LRE switches and Cisco LRE CPE, see the "Limitations and Restrictions with POTS Splitters" section on page 2-31.

If the installation does not have a PBX, a certified, homologated POTS splitter is required to connect directly to the PSTN. For more information about homologated POTS splitters, contact your Cisco sales representative.

If a connection to a telephone network is not required, a splitter is not needed, and the switch can connect directly to the patch panel.

For more information about the Cisco LRE CPE devices, see the *Cisco LRE CPE Hardware Installation Guide*.

GBIC Module Ports

The GBIC module slots support these modules:

- 1000BASE-SX GBIC module for fiber-optic connections that cannot exceed 1804 feet (550 meters).
- 1000BASE-LX/LH GBIC module for fiber-optic connections that cannot exceed 32,810 feet (10 kilometers).
- 1000BASE-ZX GBIC module for fiber-optic connections that cannot exceed 328,100 feet (100 kilometers).
- 1000BASE-T GBIC module for copper connections that cannot exceed 328 feet (100 meters).
- CWDM GBIC module for single-mode fiber-optic connections that cannot exceed 393,719 feet (120 kilometers).
- GigaStack GBIC module for creating a 1-Gbps stack configuration of up to nine supported switches. The GigaStack GBIC supports one full-duplex link (in a point-to-point configuration) or up to nine half-duplex links (in a stack configuration) to other Gigabit Ethernet devices. Using the required Cisco proprietary signaling and cabling, the GigaStack GBIC-to-GigaStack GBIC connection cannot exceed 3 feet (1 meter).

Note   Cisco-approved CWDM GBIC modules have a serial EEPROM that contains the module serial number, the vendor name and ID, a unique security code, and cyclic redundancy check (CRC). When a GBIC module is inserted in the switch, the switch software reads the EEPROM to check the serial number, vendor name, and vendor ID and recomputes the security code and CRC. If the serial number, the vendor name or ID, security code, or CRC is invalid, the switch places the interface in an error-disabled state.

Note   If you are using a non-Cisco approved CWDM GBIC module, remove the module from the switch, and replace it with a Cisco-approved module.

For more information about these GBIC modules, see your GBIC module documentation.

SFP Module Slots

On the Catalyst 2950 LRE switch, the SFP module slots support the SFP modules listed in the Catalyst 2950 LRE switch release notes.

The Catalyst 2950 LRE switch has four physical input ports that are logically bundled as two ports. Each logical port consists of a copper 10/100/1000 port and a fiber-optic SFP module slot. These ports appear as a vertical column on the front panel and are labeled Uplink Port 1 and Uplink Port 2.

Within each port, you can use only one of the two physical ports, either the SFP module port or the 10/100/1000 port. For example, you can connect to either the SFP module port or the 10/100/1000 port on Uplink Port 1. If you connect to both, in default operation, the SFP module port has priority over the 10/100/1000 port. Using this example, a valid configuration would be connecting to the fiber-optic port on Uplink Port 1 and the copper port on Uplink Port 2.

> **Note**   By using the **media-type** {**sfp** | **rj45** | **auto-select**} interface configuration command at the CLI, you can configure the Catalyst 2950 LRE switch so that the SFP module port does not take precedence over the 10/100/1000 port. In that scenario, whichever media type establishes a link first has precedence over the other.
>
> For more information about the **media-type** {**sfp** | **rj45** | **auto-select**} command, see the switch command reference.

SFP Modules

The LRE switches use Ethernet SFP modules to establish uplink connections to other devices. The SFP modules are inserted into SFP module slots on the front of the Catalyst 2950 LRE switches. These transceiver modules are field-replaceable.

You use fiber-optic cables with LC or MT-RJ connectors to connect to fiber-optic SFP modules. You use Category 5 cable with RJ-45 connectors to connect to 1000BASE-T SFP modules.

The SFP modules support nominal wavelengths from 850 to 1550 nanometers (nm). See the Catalyst 2950 LRE switch release notes for the list of supported SFP modules.

When determining where to place the switch, be sure to observe these requirements:

- For 10/100/1000 ports, including 1000BASE-T SFP module ports, cable lengths from the switch to connected devices are up to 328 feet (100 meters).

- Table 1-2 lists the cable specifications for 1000BASE-SX, 1000BASE-LX, and 1000BASE-ZX fiber-optic SFP module connections. Each port must match the wave-length specifications on the other end of the cable, and for reliable communications, the cable must not exceed the stipulated cable length.

Table 1-2   Fiber-Optic SFP Module Port Cabling Specifications

SFP Module	Wavelength (nanometers)	Fiber Type	Core Size (micron)	Modal Bandwidth (MHz/km)	Cable Distance
1000BASE-SX	850	MMF	62.5 62.5 50 50	160 200 400 500	722 feet (220 m) 902 feet (275 m) 1640 feet (500 m) 1804 feet (550 m)
1000BASE-LX/LH	1300	MMF[1] SMF	62.5 50 50 9/10	500 400 500 —	1804 feet (550 m) 1804 feet (550 m) 1804 feet (550 m) 32,810 feet (10 km)
1000BASE-ZX	1550	SMF	9/10	—	43.4 to 62 miles (70 to 100 km)[2]

1. A mode-conditioning patch cord is required. Using an ordinary patch cord with MMF, 1000BASE-LX/LH SFP modules, and a short link distance can cause transceiver saturation, resulting in an elevated bit error rate (BER). When using the LX/LH SFP module with 62.5-micron diameter MMF, you must also install a mode-conditioning patch cord between the SFP module and the MMF cable on both the sending and receiving ends of the link. The mode-conditioning patch cord is required for link distances greater than 984 feet (300 m).

2. 1000BASE-ZX SFP modules can send up to 62 miles (100 km) by using dispersion-shifted SMF or low-attenuation SMF; the distance depends on the fiber quality, the number of splices, and the connectors.

Note   When using shorter distances of single-mode fiber cable, you might need to insert an inline optical attenuator in the link to avoid overloading the receiver.

When the fiber-optic cable span is less than 15.43 miles (25 km), you should insert a 5-decibel (dB) or 10-dB inline optical attenuator between the fiber-optic cable plant and the receiving port on the 1000BASE-ZX SFP module at each end of the link.

Use only Cisco-approved SFP modules on the Catalyst 2950 LRE switch.

Note   Cisco-approved SFP modules have a serial EEPROM that contains the module serial number, the vendor name and ID, a unique security code, and cyclic redundancy check (CRC). When an SFP module is inserted in the switch, the switch software reads the EEPROM to check the serial number, vendor name, and vendor ID and recomputes the security code and CRC. If the serial number, the vendor name or ID, security code, or CRC is invalid, the switch places the interface in an error-disabled state.

Note   If you are using a non-Cisco approved SFP module, remove the module from the switch, and replace it with a Cisco-approved module.

For more information about these SFP modules, see your SFP module documentation.

LEDs

You can use the LEDs to monitor switch activity and performance. The locations and numbers of the LEDs vary among switch models. The location of the Mode button that you use to select the port mode also varies by model. See these figures:

- Figure 1-15 for the Catalyst 2950-12, 2950-24, 2950C-24, 2950SX-24, and 2950T-24 switches
- Figure 1-16 for the Catalyst 2950G-12-EI, 2950G-24-EI, and 2950G-24-EI-DC switches
- Figure 1-17 for the Catalyst 2950G-48-EI, Catalyst 2950SX-48-SI, and Catalyst 2950T-48-SI switches
- Figure 1-18 for the Catalyst 2950ST-8 LRE and 2950ST-24 LRE switches
- Figure 1-19 for the Catalyst 2950ST-24 LRE 997 switches

All LEDs (except the utilization meter [UTIL]) are visible through the GUI management applications—the Network Assistant application for multiple switches and the device manager for a single switch. The switch software configuration guide describes how to use the command-line interface (CLI) to configure and to monitor individual switches and switch clusters.

Figure 1-15   LEDs on Catalyst 2950-12, 2950-24, 2950C-24, 2950SX-24, and 2950T-24 Switches
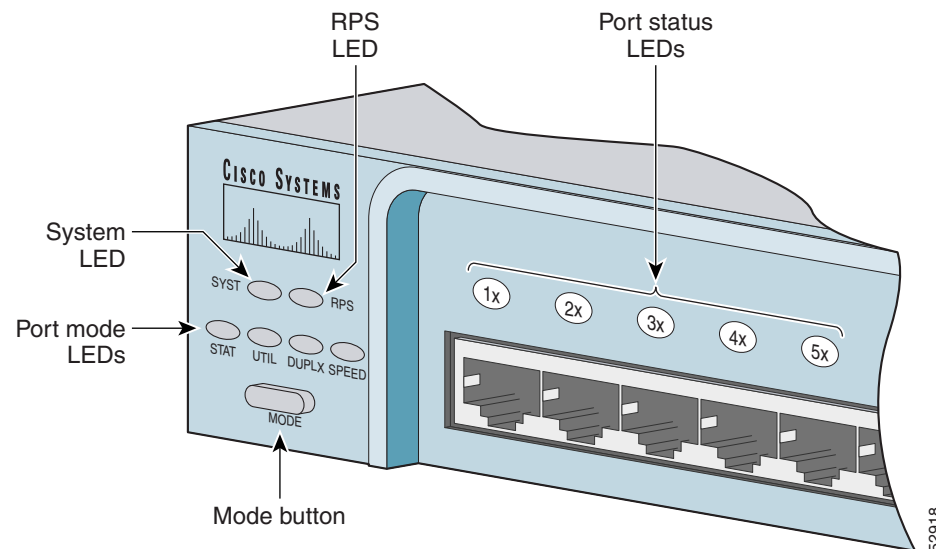
Figure 1-16   LEDs on Catalyst 2950G-12-EI, 2950G-24-EI, and 2950G-24-EI-DC Switches
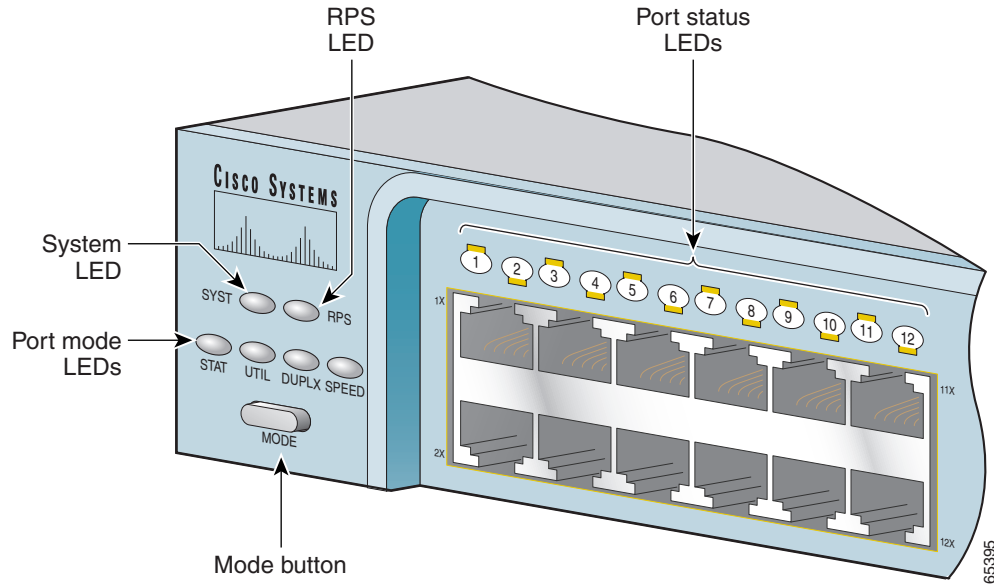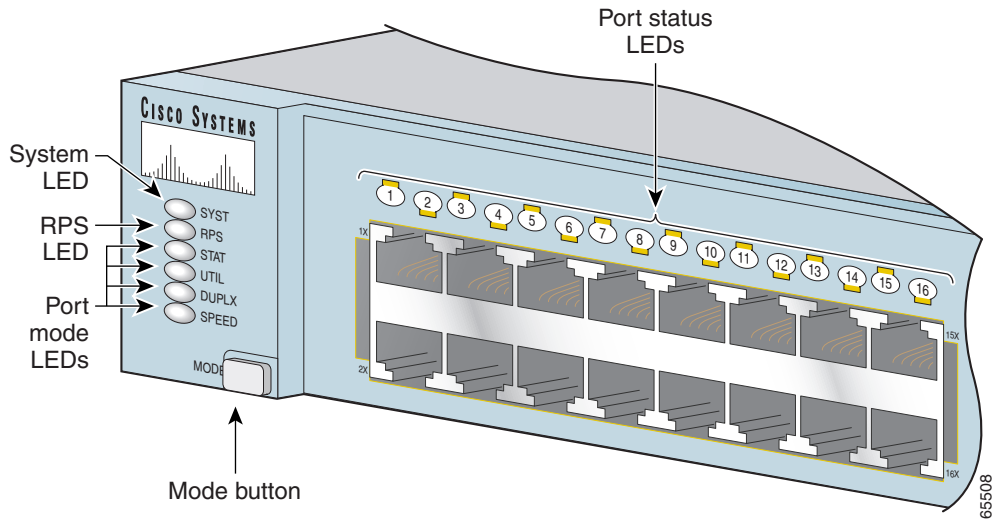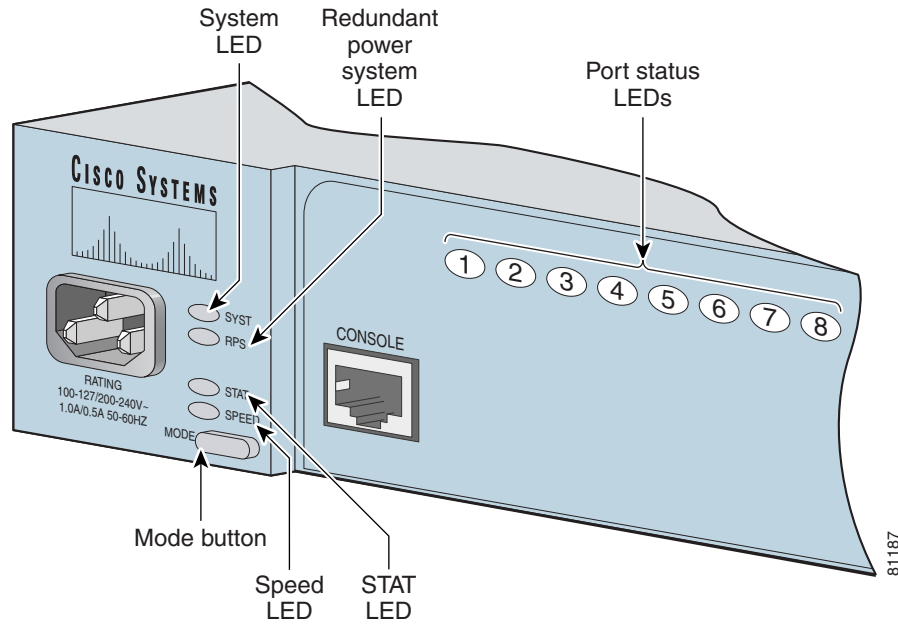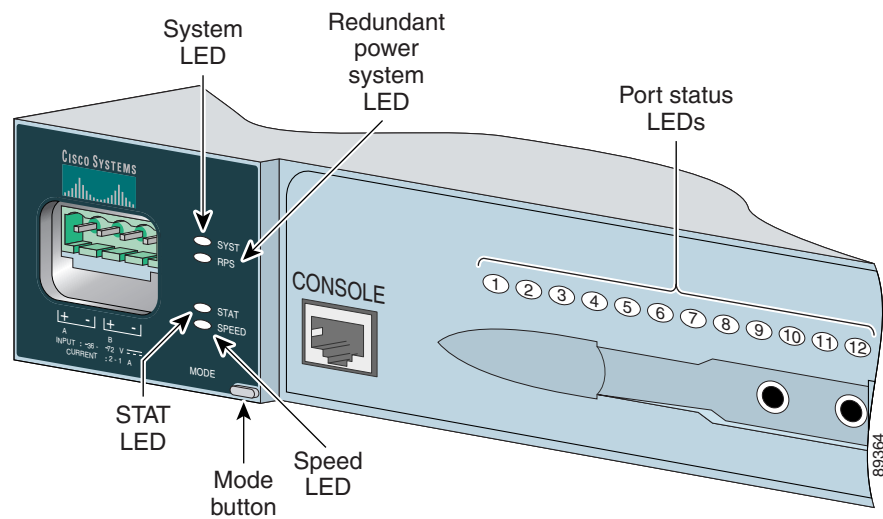

Figure 1-17   LEDs on Catalyst 2950G-48-EI, 2950SX-48-SI, and 2950T-48-SI Switches

Figure 1-18   LEDs on Catalyst 2950ST-8 LRE and 2950ST-24 LRE Switches

Figure 1-19   LEDs on Catalyst 2950ST-24 LRE 997 Switches

System LED

The system LED shows whether the system is receiving power and functioning properly. Table 1-3 lists the LED colors and meanings.

Table 1-3   System LED

Color	System Status
Off	System is not powered up.
Green	System is operating normally.
Amber	System is receiving power but is not functioning properly.

For information about the system LED colors during the power-on self-test (POST), see the "Connecting to a Power Source" section on page D-5.

RPS LED

The RPS LED shows the RPS status. Table 1-4 lists the LED colors and meanings.

Table 1-4   RPS LED

Color	RPS Status
Off	RPS is off or is not installed.
Solid green	RPS is connected and ready to provide back-up power.
Flashing green	RPS is connected but is unavailable because it is providing power to another device (redundancy has been allocated to a neighboring device).
Solid amber	RPS is in standby mode or in a fault condition. Press the Standby/Active button on the RPS, and the LED should turn green. If it does not, the RPS fan could have failed. Contact Cisco Systems.
Flashing amber	The internal power supply in a switch has failed, and the RPS is providing power to the switch (redundancy has been allocated to this device).

For more information about the Cisco RPS 300, see the *Cisco RPS 300 Redundant Power System Hardware Installation Guide*.

For more information about the Cisco RPS 675, see the *Cisco RPS 675 Redundant Power System Hardware Installation Guide*.

Port Mode and Port Status LEDs

To select or change the port mode, press the Mode button (see Figure 1-15 to Figure 1-18) to highlight the mode that you want. Release the button to enable the highlighted mode.

Each port has a port status LED, also called a port LED. These LEDs, as a group or individually, display information about the switch and the individual ports. The port modes (see Table 1-5) determine the type of information displayed.

Table 1-5   Port Mode LEDs

Mode LED	Port Mode	Description
STAT	Port status	The port status. This is the default mode.
UTIL[1]	Switch utilization	The bandwidth in use by the switch.
DUPLX	Port duplex mode	The port duplex mode: half duplex or full duplex.
SPEED	Port speed	The port operating speed: 10 or 100 Mbps for 10/100 ports and 10, 100, or 1000 Mbps for 10/100/1000 ports.

1. A Catalyst 2950 LRE switch does not have a UTIL or a DUPLX LED.

When you change the port mode, the meanings of the port LED colors change. Table 1-6 explains how to interpret these colors for the non-LRE switches. Table 1-7 explains how to interpret the colors for the LRE switches. The port LEDs are off when the MODE is set to SPEED.

Table 1-6   Meaning of Port LED Colors in Different Modes for Non-LRE Switches

Port Mode	Color	Meaning
STAT (port status)	Off	No link.
	Solid green	Link present.
	Flashing green	Activity. Port is sending or receiving data.
	Alternating green-amber	Link fault. Error frames can affect connectivity, and errors such as excessive collisions, CRC errors, and alignment and jabber errors are monitored for a link-fault indication.
	Solid amber	Port is not forwarding. Port was disabled by management, an address violation, or Spanning Tree Protocol (STP). **Note** After a port is reconfigured, the port LED can remain amber for up to 30 seconds while STP checks the switch for possible loops.
UTIL (utilization)	Green	The current backplane utilization that is displayed over the amber LED background on a logarithmic scale.
	Amber	The maximum backplane utilization since the switch was powered on.
	Green and amber	See Figure 1-20 to Figure 1-24 for details. **Note** If the current utilization exceeds the maximum utilization, the maximum utilization is automatically updated.
DUPLX (half or full duplex)	Off	Port is operating in half duplex.
	Green	Port is operating in full duplex.

Table 1-6   Meaning of Port LED Colors in Different Modes for Non-LRE Switches (continued)

Port Mode	Color	Meaning
SPEED	10/100 ports	
	Off	Port is operating at 10 Mbps.
	Green	Port is operating at 100 Mbps.
	10/100/1000 ports	
	Off	Port is operating at 10 Mbps.
	Green	Port is operating at 100 Mbps.
	Flashing green	Port is operating at 1000 Mbps.
	1000BASE-X GBIC module ports	
	Off	Port is not operating.
	Green	Port is operating at 1000 Mbps.

Table 1-7   Meaning of Port LED Colors in Different Modes for the LRE Switches

Port Mode	Color	Meaning
STAT (port status)	Off	No link.
	Solid green	Link present.
		Note The LRE port LED turns green approximately 30 seconds after the LRE port detects a connection to an LRE CPE.
	Flashing green	Activity. Port is sending or receiving data.
	Alternating green-amber	Link fault. Error frames can affect connectivity, and errors such as excessive collisions, CRC errors, and alignment and jabber errors are monitored for a link-fault indication.
	Solid amber	A link is established on a nonassigned LRE profile, or a port is not forwarding.
		If a port is not forwarding, it was disabled by management, an address violation, or STP.
		Note After a port is reconfigured, the port LED can remain amber for up to 30 seconds while STP checks the switch for possible loops.
DUPLX (half or full duplex)	Off	Port is operating in half duplex.
	Green	Port is operating in full duplex.

Table 1-7   Meaning of Port LED Colors in Different Modes for the LRE Switches (continued)

Port Mode	Color	Meaning
SPEED	10/100/1000 ports[1] [2]	
	Off	Port is operating at 10 Mbps.
	Green	Port is operating at 100 Mbps.
	Flashing green	Port is operating at 1000 Mbps.
	SFP modules[1] [2]	
	Off	Port is operating at 10 Mbps
	Green	Port is operating at 100 Mbps
	Flashing green	Port is operating at 1000 Mbps

1. On an LRE switch, the LEDs for Uplink Port 1 and Uplink Port 2 correspond either to the SFP module port or to the 10/100/1000 port, depending on which is active.

2. If an LRE switch senses connections to both ports, by default, the switch chooses the fiber-optic connection over the copper connection.

For more information about GBIC LEDs, see your GBIC module documentation.

Figure 1-20 to Figure 1-24 show the bandwidth utilization percentages displayed by the right-most LEDs.

Note   The Catalyst 2950 LRE switch LEDs do not give utilization status.

If all LEDs on a Catalyst 2950-12, 2950-24, 2950C-24, 2950SX-24, or 2950T-24 switch are green (no amber showing), the switch is using 50 percent or more of the total bandwidth. If the far-right LED is off, the switch is using more than 25 but less than 50 percent of the total bandwidth, and so on. If only the far-left LED is green, the switch is using less than 0.0488 percent of the total bandwidth. (See Figure 1-20 and Figure 1-21.)

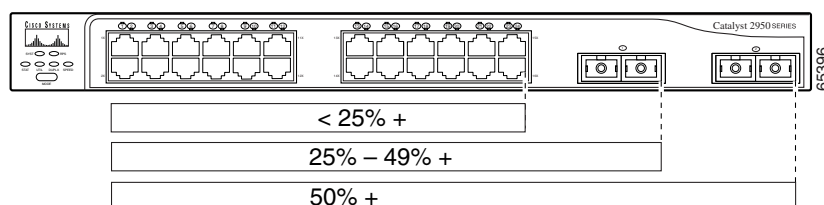*Figure 1-20   Bandwidth Utilization on Catalyst 2950-12 Switches*
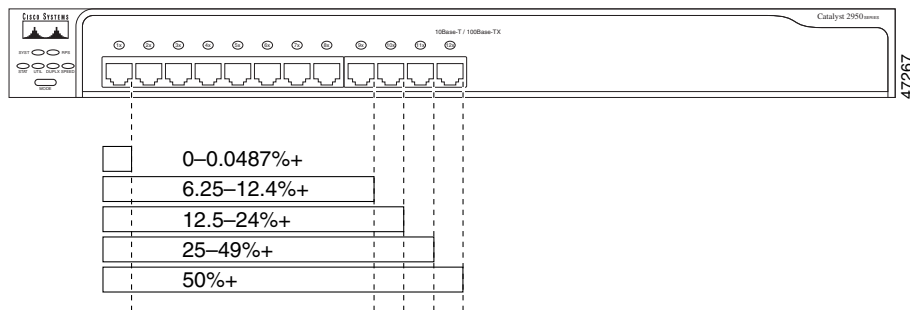
Figure 1-21   Bandwidth Utilization on Catalyst 2950-24, 2950C-24, 2950SX-24, and 2950T-24 Switches
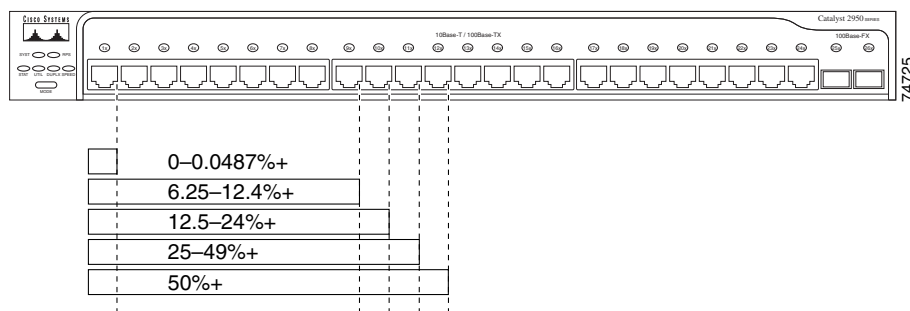
If all LEDs on a Catalyst 2950G-12-EI switch are green (no amber showing), the switch is using 50 percent or more of the total bandwidth. If the LED for GBIC module slot 2 is off, the switch is using more than 25 but less than 50 percent of the total bandwidth. If LEDs for both GBIC module slots are off, the switch is using less than 25 percent of the total bandwidth, and so on. (See Figure 1-22.)

Figure 1-22   Bandwidth Utilization on Catalyst 2950G-12-EI Switches
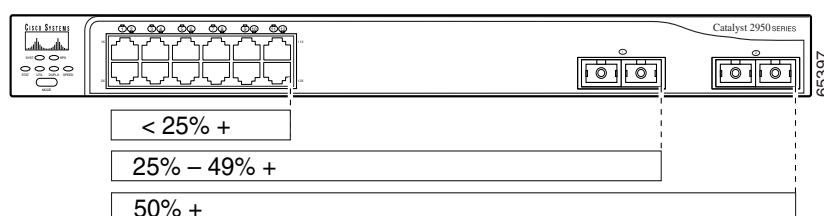
If all LEDs on a Catalyst 2950G-24-EI or 2950G-24-EI-DC switch are green (no amber showing), the switch is using 50 percent or more of the total bandwidth. If the LED for GBIC module slot 2 is off, the switch is using more than 25 but less than 50 percent of the total bandwidth. If LEDs for both GBIC module slots are off, the switch is using less than 25 percent of the total bandwidth, and so on. (See Figure 1-23.)

Figure 1-23   Bandwidth Utilization on Catalyst 2950G-24-EI and 2950G-24-EI-DC Switches

If all LEDs on a Catalyst 2950G-48-EI, 2950SX-48-SI, or 2950T-48-SI switch are green, the switch is using 50 percent or more of the total bandwidth. If the LED for GBIC module slot 2 is off, the switch is using more than 25 but less than 50 percent of the total bandwidth. If LEDs for both GBIC module slots are off, the switch is using less than 25 percent of the total bandwidth, and so on. (See Figure 1-24.)

Figure 1-24   Bandwidth Utilization on Catalyst 2950G-48-EI, 2950SX-48-SI, and 2950T-48-SI Switches


< 25% +
25% − 49% +
50% +
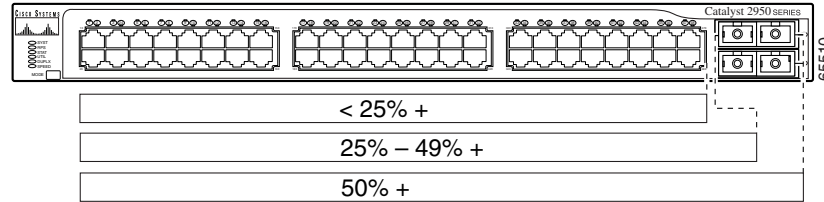
Rear-Panel Description

Other than the Catalyst 2950G-24-EI-DC switch and the Catalyst 2950 LRE switches, the rear panel of a Catalyst 2950 switch has an AC power connector, an RPS connector, and an RJ-45 console port. (See Figure 1-25 and Figure 1-26.)

The rear panel of the Catalyst 2950G-24-EI-DC switch has a DC power connector (also referred to as the terminal block header), a DC ground lug, an RPS connector, and an RJ-45 console port. (See Figure 1-27.)

The rear panel of the Catalyst 2950ST-8 LRE, 2950ST-24 LRE, and 2950ST-24 LRE 997 switches has only an RPS connector. (See Figure 1-28.)

Figure 1-25   Catalyst 2950 Switch Rear Panel
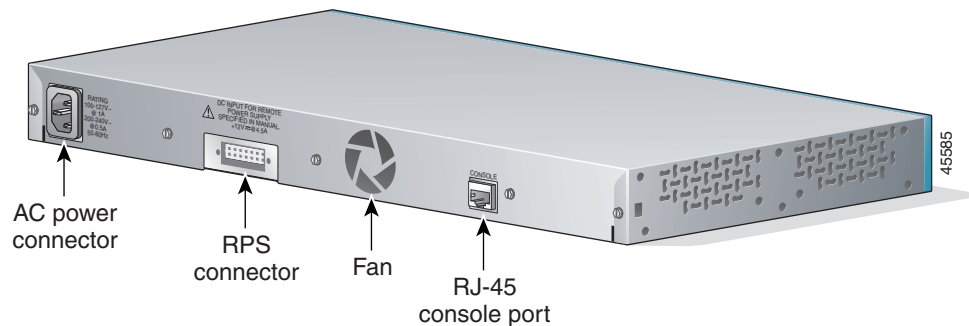
Figure 1-26   Catalyst 2950G-48-EI, Catalyst 2950SX-48-SI, and Catalyst 2950T-48-SI Switch Rear Panel
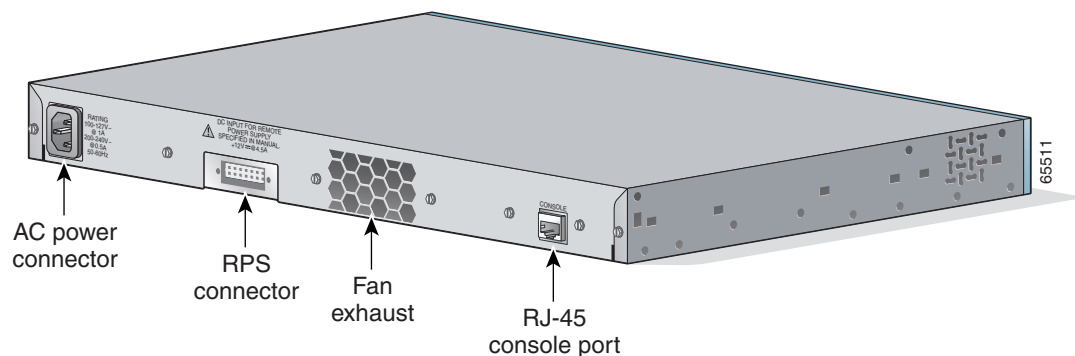
Figure 1-27   Catalyst 2950G-24-EI-DC Switch Rear Panel
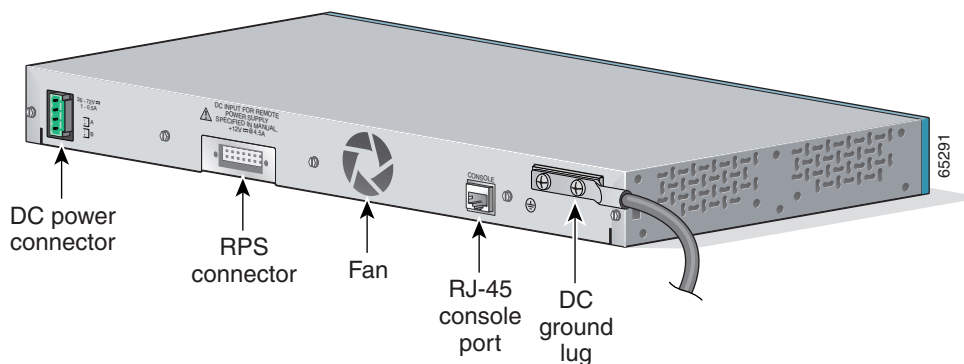
Figure 1-28   Catalyst 2950ST-8 LRE Switch, Catalyst 2950ST-24 LRE, and Catalyst 2950ST-24 LRE 997 Switch Rear Panel
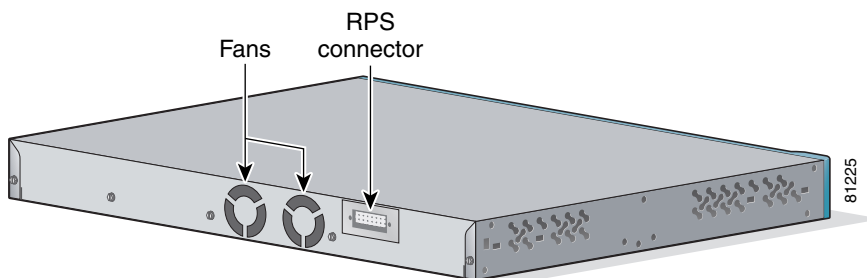
Power Connectors

You can provide power to a switch by using the AC internal power supply, the DC-input power source, or the Cisco RPS.

Internal Power Supply Connector

The internal AC power supply is an autoranging unit that supports input voltages between 100 and 240 VAC. Other than for the Catalyst 2950G-24-EI-DC and the Catalyst 2950ST-24 LRE 997 switches, use the supplied AC power cord to connect the AC power connector to an AC power outlet.

Note   The AC power connector is on the front panel of the Catalyst 2950ST-8 LRE and Catalyst 2950ST-24 LRE switches.

You can order these L-shaped AC power cords from your Cisco sales representative:

- CAB-NP1200-AC-AR=
- CAB-NP1200-AC-AU=
- CAB-NP1200-AC-CH=
- CAB-NP1200-AC-EU=

- CAB-NP1200-AC-IT=
- CAB-NP1200-AC-JP=
- CAB-NP1200-AC-UK=
- CAB-NP1200-AC-US=

DC Power Connector

The Catalyst 2950G-24-EI-DC and Catalyst 2950ST-24 LRE 997 switches have an internal DC-power converter. It has dual feeds (A and B) that are diode-OR-ed into a single power block. For installation instructions, see Appendix C, "Connecting to DC Power."

⚠
Caution   You must connect the Catalyst 2950G-24-EI-DC and 2950ST-24 LRE 997 switches only to a DC-input power source that has an input supply voltage from –36 to –72 VDC. If the supply voltage is not in this range, the switch might not operate properly or might be damaged.

Cisco RPS Connector

Specific Cisco RPS models support specific Catalyst 2950 switches:

- Cisco RPS 300 (model PWR300-AC-RPS-N1)
- Cisco RPS 675 (model PWR675-AC-RPS-N1=)

Cisco RPS 300

The Cisco RPS 300 has two output levels: –48 V and 12 V with a total maximum output power of 300 W. Use the supplied RPS connector cable to connect the RPS to the switch.

⚠
Warning   **Attach only the Cisco RPS 300 (model PWR300-AC-RPS-N1) to the RPS receptacle.** Statement 100B

The RPS is a 300-W redundant power system that can support six external network devices and provides DC power to one failed device at a time. It automatically senses when the internal power supply of a connected device fails and provides power to that device, preventing loss of network traffic.

For more information, see the Cisco RPS 300 documentation.

Cisco RPS 675

The Cisco RPS 675 has two output levels: –48 V and 12 V with a total maximum output power of 675 W. Use the supplied RPS connector cable to connect the RPS to the switch.

⚠
Warning   **Attach only the Cisco RPS 675 (model PWR675-AC-RPS-N1=) to the RPS receptacle.** Statement 100C

The RPS is a 675-W redundant power system that can support six external network devices and provides DC power to one failed device at a time. It automatically senses when the internal power supply of a connected device fails and provides power to that device, preventing loss of network traffic.

For more information, see the Cisco RPS 675 documentation.

Console Port

You can connect a switch to a PC through the console port and the supplied RJ-45-to-DB-9 adapter cable. If you want to connect a switch to a terminal, you need to provide an RJ-45-to-DB-25 female DTE adapter. You can order a kit (part number ACS-DSBUASYN=) with that adapter from Cisco. For console-port and adapter-pinout information, see the "Cable and Adapter Specifications" section on page B-6.

Management Options

Catalyst 2950 switches offer these management options:

- Network Assistant

- The Network Assistant is a GUI-based application that you can install and run on your desktop; you do not need a web browser to run it. You can use Network Assistant to manage and monitor switch clusters or standalone devices. For more information, see the *Getting Started with Cisco Network Assistant* guide and the Network Assistant online help.

- Device Manager

  You can use the device manager, which is in the switch memory, to manage individual and standalone switches. Use the device manager to perform basic switch configuration and monitoring. You can access the device manager from anywhere in your network through a web browser.

  To launch the Device Manager, enter the switch IP address in the web browser, and press **Enter**. The device manager page appears.

  Refer to the device manager online help for more information.

- Cisco IOS CLI.

  You can manage switches by using command-line entries. To access the CLI, connect a PC or a terminal directly to the console port on the switch. If the switch is attached to your network, you can use a Telnet connection to manage the switch from a remote location. For more information, see the switch command reference.

  For setup instructions that use the CLI, go to Appendix D, "Configuring the Switch with the CLI-Based Setup Program."

- CiscoView application

  You can use the CiscoView device-management application to set configuration parameters and to view switch status and performance information. This application, which you purchase separately, can be a standalone application or part of an Simple Network Management Protocol (SNMP) network-management platform. For more information, see the documentation that came with your CiscoView application.

- SNMP network management

  You can manage switches by using an SNMP-compatible management station running platforms such as HP OpenView and SunNet Manager. The switch supports a comprehensive set of management information base (MIB) extensions and MIB II, the IEEE 802.1D bridge MIB, and four Remote Monitoring (RMON) groups. For more information, see the documentation that came with your SNMP application.

- Cisco Intelligence Engine 2100 (IE2100)

The Cisco IE200 Series Configuration Registrar is a network management device that works with embedded Cisco Networking Services (CNS) agents in the switch software. You can automate initial configurations and configuration updates by generating switch-specific configuration changes, sending them to the switch, executing the configuration change, and logging the results. For more information, see the switch software configuration guide and the documentation that came with your application.

Installation

This chapter describes how to install your switch, interpret the power-on self-test (POST), and connect the switch to other devices. Read these topics, and perform the procedures in this order:

Preparing for Installation

This section provides information about these topics:

Warnings

For translations of these warnings in several languages, see the *Regulatory Compliance and Safety Information for the Catalyst 2950 Switch*.

Warning **Attach only the Cisco Redundant Power Supply (RPS) (model PWR300-AC-RPS-N1) to the RPS receptacle.** Statement 100B

Warning   **Attach only the Cisco RPS (model PWR675-AC-RPS-N1) to the RPS receptacle.** Statement 100C

Warning   **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

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

Warning   **The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device.** Statement 1019

Warning   **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**

- **This unit should be mounted at the bottom of the rack if it is the only unit in the rack.**

- **When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.**

- **If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.** Statement 1006

Warning   **To prevent the switch from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 113°F (45°C). To prevent airflow restriction, allow at least 3 inches (7.6 cm) of clearance around the ventilation openings.** Statement 17B

Warning   **This equipment is intended to be grounded to comply with emission and immunity requirements. Ensure that the switch functional ground lug is connected to earth ground during normal use.** Statement 1064

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

Warning   **When installing the unit, always make the ground connection first and disconnect it last.** Statement 42

Warning   **This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use.** Statement 39

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 stack the chassis on any other equipment. If the chassis falls, it can cause severe bodily injury and equipment damage.** Statement 48

Warning   **To comply with safety regulations, mount switches on a wall with the front panel facing up.** Statement 266

Warning   **If an RPS is not connected to the switch, install an RPS connector cover on the back of the switch.** Statement 265

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

Warning   **Class 1 laser product.** Statement 1008

Warning   **Avoid direct exposure to the laser beam.** Statement 1012

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   **The Catalyst 2950G-24-EI-DC contains no field-replaceable units (FRUs). Do not open the chassis or attempt to remove or replace any components. For information about obtaining service for this unit, contact your reseller or Cisco sales representative.** Statement 121C

Warning   **The Catalyst 2950ST-24 LRE 997 contains no field-replaceable units (FRUs). Do not open the chassis or attempt to remove or replace any components. For information about obtaining service for this unit, contact your reseller or Cisco sales representative.** Statement 121D

⚠ **Warning**   **This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.** Statement 1017

⚠ **Warning**   **Ethernet cables must be shielded when used in a central office environment.** Statement 171

⚠ **Warning**   **Before connecting or disconnecting ground or power wires to the chassis, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position. Use a voltmeter to test for 0 (zero) voltage at the power terminals on the chassis.** Statement 196

⚠ **Warning**   **An exposed wire lead from a DC-input power source can conduct harmful levels of electricity. Be sure that no exposed portion of the DC-input power source wire extends from the terminal block plug.** Statement 122

⚠ **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.** Statement 88

Installation Guidelines

When determining where to place the switch, observe these guidelines.

- Before installing the switch, first verify that the switch is operational by powering it on and running POST. Follow the procedures in the "Verifying Switch Operation" section on page 2-6.

- For 10/100 ports and 10/100/1000 ports, the cable length from a switch to an attached device cannot exceed 328 feet (100 meters).

- For 100BASE-FX ports, the cable length from a switch to an attached device cannot exceed 6562 feet (2 kilometers).

- For 1000BASE-SX ports and 1000BASE-SX Gigabit Interface Converter (GBIC) module ports, the cable length from a switch to an attached device cannot exceed 1804 feet (550 meters).

- For 1000BASE-LX/LH GBIC module ports, the cable length from a switch to an attached device cannot exceed 32,810 feet (10 kilometers).

- For 1000BASE-ZX GBIC module ports, the cable length from a switch to an attached device cannot exceed 328,100 feet (100 kilometers).

- For 1000BASE-T GBIC module ports, the cable length from a switch to an attached device cannot exceed 328 feet (100 meters).

- For Coarse Wave Division Multiplexing (CWDM) GBIC module ports, the cable length from a switch to an attached device cannot exceed 393,719 feet (120 kilometers). For specific cable lengths, see the CWDM GBIC module documentation.

- For GigaStack GBIC module ports, the cable length from a switch to an attached device cannot exceed 3 feet (1 meter).

- For Long-Reach Ethernet (LRE) ports, cable-length specifications vary. See the "LRE Port" section on page 1-9.

- Operating environment is within the ranges listed in Appendix A, "Technical Specifications."

- Clearance to front and rear panels meet these conditions:

  - Front-panel LEDs can be easily read.

  - Access to ports is sufficient for unrestricted cabling.

  - Rear-panel AC power connector on switches other than the LRE switches is within reach of an AC power outlet.

  - Rear-panel direct current (DC) power connector on the Catalyst 2950G-24-EI-DC switch is within reach of a circuit breaker.

  - Front-panel AC power connector on the LRE switches is within reach of an AC power outlet.

  - Front-panel DC power connector on the Catalyst 2950ST-24 LRE 997 switch is within reach of a circuit breaker.

- Airflow around the switch and through the vents is unrestricted.

- Temperature around the unit does not exceed 113°F (45°C).

> **Note** If the switch is installed in a closed or multirack assembly, the temperature around it might be greater than normal room temperature.

- Cabling is away from sources of electrical noise, such as radios, power lines, and fluorescent lighting fixtures.

- For sites requiring compliance to Telcordia GR-1089-CORE Intra-building Lightning requirements, all 10/100 and 10/100/1000 ports must be connected with shielded cable grounded at both ends.

Verifying Package Contents

> **Note** Carefully remove the contents from the shipping container, and check each item for damage. If any item is missing or damaged, contact your Cisco representative or reseller for support. Return all packing materials to the shipping container and save them.

The switch is shipped with these items:

- *Catalyst 2950 Switch Getting Started Guide*

- *Regulatory Compliance and Safety Information for the Catalyst 2950 Switch*

- AC power cord (not shipped with the Catalyst 2950G-24-EI-DC switch or the Catalyst 2950ST-24 LRE 997 switch)

- Console cable

- Mounting kit containing these items:

  - Four rubber feet for mounting the switch on a table, shelf, or desk

  - Two 19-inch or 24-inch rack-mounting brackets

- Six number-8 Phillips flat-head screws for attaching the brackets to the switch
- Four number-8 Phillips truss-head screws for attaching the brackets to the switch
- Four number-12 Phillips machine screws for attaching the brackets to a rack
- One cable guide and one black Phillips machine screw for attaching the cable guide to one of the mounting brackets
- One RPS connector cover and two number-4 pan-head screws

- DC-switch kit containing these items:
  - One DC terminal block plug (also called a terminal block header)
  - One ground lug
  - Two number-10-32 screws for attaching the ground lug to the switch
  - Two 23-inch rack-mounting brackets (with 1-inch spacing for telco racks)
  - Four number-8 Phillips truss-head screws for attaching the brackets to the switch
  - Two number-12 Phillips machine screws for attaching the brackets to a rack

Note The DC-switch kit ships only with the Catalyst 2950G-24-EI-DC or Catalyst 2950ST-24 LRE 997 switch.

- One RJ-45-to-DB-9 adapter cable
- Product ownership registration card

If you want to connect a terminal to the switch console port, you need to provide an RJ-45-to-DB-25 female DTE adapter. You can order a kit (part number ACS-DSBUASYN=) with that adapter from Cisco.

Verifying Switch Operation

Before installing the switch in a rack, on a wall, or on a table or shelf, you should power on the switch and verify that the switch passes POST. See Section 3, "Running Express Setup," in the getting started guide for the steps required to connect a PC to the switch console port and to power on the switch.

While the switch powers on, it automatically begins POST, a series of tests that verifies that the switch functions properly. When the switch begins POST, the system LED is off. POST has completed successfully when the SYST and STAT LEDs are green.

If a switch fails POST, the System LED turns amber. If POST fails, see Chapter 3, "Troubleshooting," to determine a course of action.

Note POST failures are usually fatal. Call Cisco Systems if your switch does not pass POST.

After a successful POST, follow these steps:

Step 1 Turn off power to the switch.

Step 2 Disconnect the cables.

Step 3 Determine where you want to install the switch.

Installing the Switch

This section describes these installation procedures:

Installing the Switch in a Rack

Use these instructions to install the switch in a rack:

Warning   **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**

- **This unit should be mounted at the bottom of the rack if it is the only unit in the rack.**
- **When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.**
- **If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.** Statement 1006

Note   Figure 2-1 to Figure 2-15 show the Catalyst 2950-24, 2950G-24-EI-DC, and 2950G-48-EI switches as examples. You can install other Catalyst 2950 switches in a rack as shown in these illustrations.

To install the switch in a 19-, 23-, or 24-inch rack, follow these steps:

1. Attaching the Brackets to the Switch, page 2-8
2. Mounting the Switch in a Rack, page 2-16
3. Attaching the Optional Cable Guide, page 2-16

Note   Installing a Catalyst 2950G-48-EI, Catalyst 2950SX-48-SI, or Catalyst 2950T-48-SI switch in a 23-inch or 24-inch rack requires an optional bracket kit not included with the switch. You can order a kit containing the 23-inch or 24-inch rack-mounting brackets and hardware from Cisco (part number RCKMNT-1RU=).

Attaching the Brackets to the Switch

The bracket orientation and the screws that you use depend on whether you are attaching the brackets to a 19-, 23-, or 24-inch rack. Follow these guidelines:

- When mounting a switch other than a Catalyst 2950G-48-EI, Catalyst 2950SX-48-SI, or Catalyst 2950T-48-SI switch in a 19-inch rack, use two Phillips flat-head screws to attach the long side of the 19- or 24-inch bracket to the switch. See Figure 2-1, Figure 2-2, and Figure 2-3.

- When mounting a Catalyst 2950G-48-EI, Catalyst 2950SX-48-SI, or Catalyst 2950T-48-SI switch in a 19-inch rack, use three Phillips flat-head screws to attach the long side of the 19- or 24-inch bracket to the switch. See Figure 2-4, Figure 2-5, and Figure 2-6.

- When mounting a Catalyst 2950G-24-EI-DC or Catalyst 2950ST-24 LRE 997 switch in a 23-inch rack, use two Phillips truss-head screws to attach the 23-inch bracket to the switch. See Figure 2-7, Figure 2-8, and Figure 2-9.

- When mounting a switch other than a Catalyst 2950G-48-EI, Catalyst 2950SX-48-SI, or Catalyst 2950T-48-SI switch in a 24-inch rack, use two Phillips truss-head screws to attach the 19- or 24-inch bracket to the switch. See Figure 2-10, Figure 2-11, and Figure 2-12.

- When mounting a Catalyst 2950G-48-EI, Catalyst 2950SX-48-SI, or Catalyst 2950T-48-SI switch in a 24-inch rack, use three Phillips flat-head screws to attach the 24-inch bracket (part number RCKMNT-1RU=) to the switch. See Figure 2-13, Figure 2-14, and Figure 2-15.

Figure 2-1 to Figure 2-15 show how to attach a bracket to one side of the switch. Follow the same steps to attach the second bracket to the opposite side of the switch.

Figure 2-1   Attaching Brackets on the Switch in a 19-Inch Rack (Front Panel Forward)

Number-8
Phillips flat-head
screws
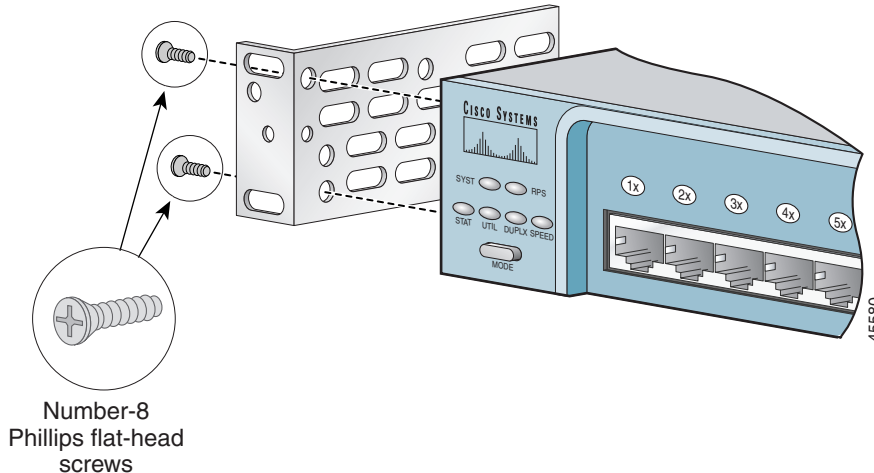
Figure 2-2   Attaching Brackets on the Switch in a 19-Inch Rack (Rear Panel Forward)

Number-8
Phillips flat-head
screws

52916
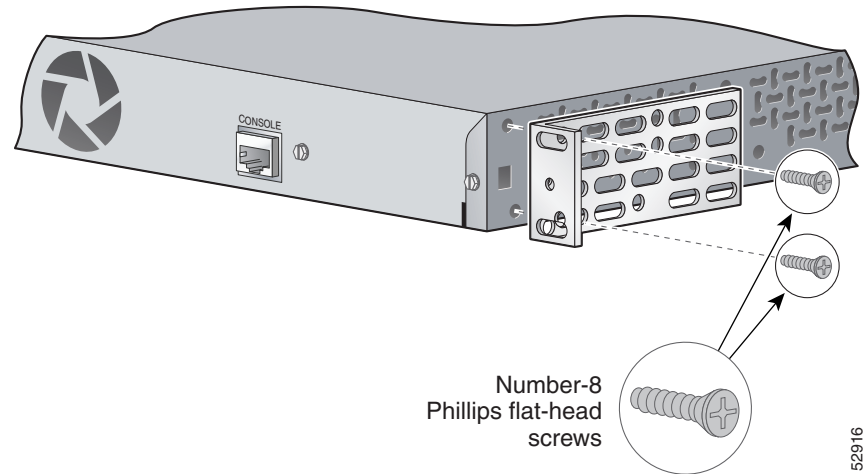
Figure 2-3   Attaching Brackets on the Switch in a 19-Inch Telco Rack

Number-8
Phillips flat-head
screws

45582
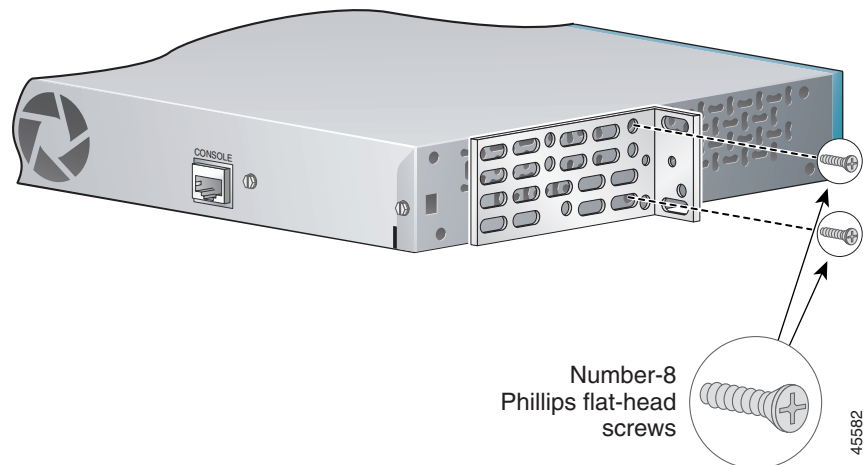
Figure 2-4   Attaching Brackets on a Catalyst 2950G-48-EI, Catalyst 2950SX-48-SI, or Catalyst 2950T-48-SI Switch in a 19-Inch Rack (Front Panel Forward)
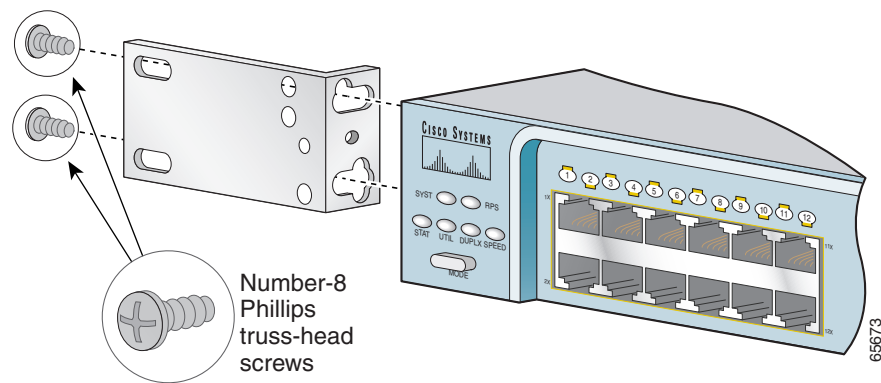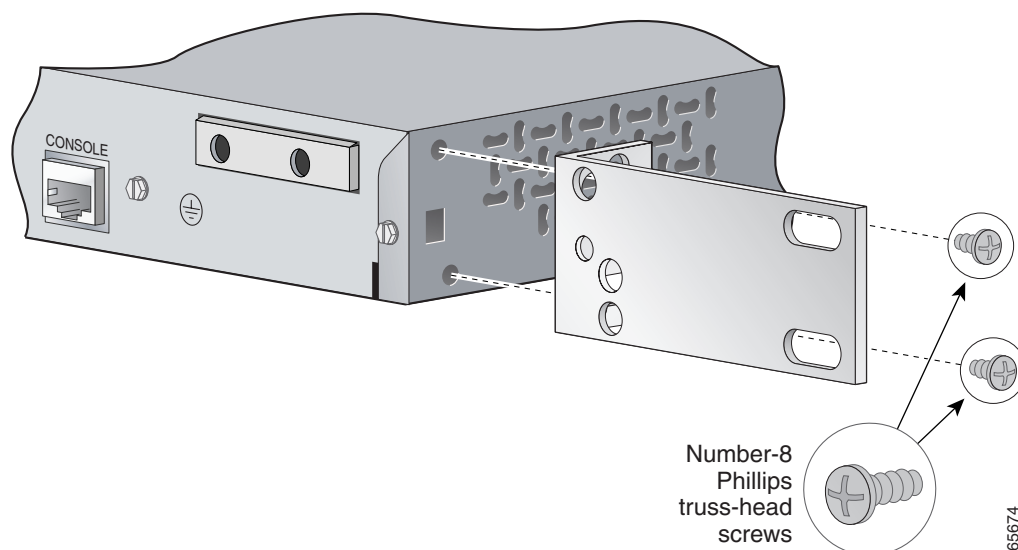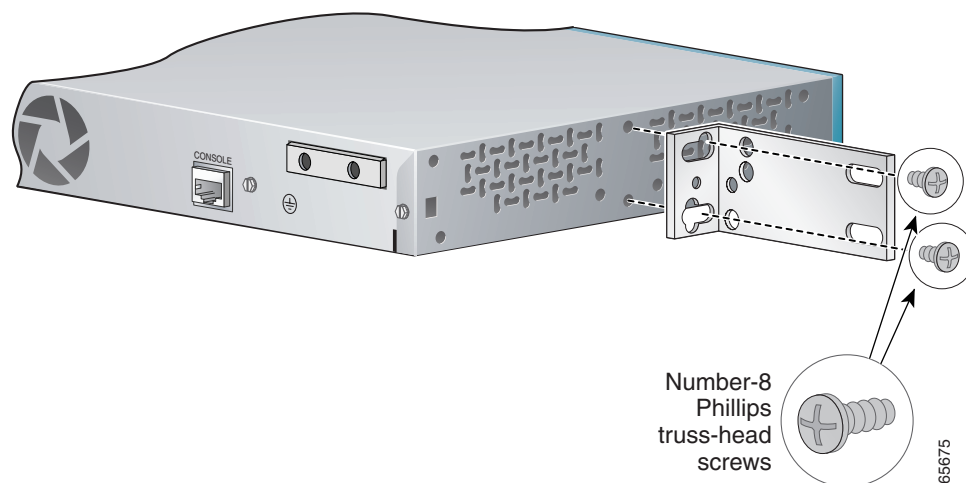
Number-8
Phillips
flat-head
screws

65512
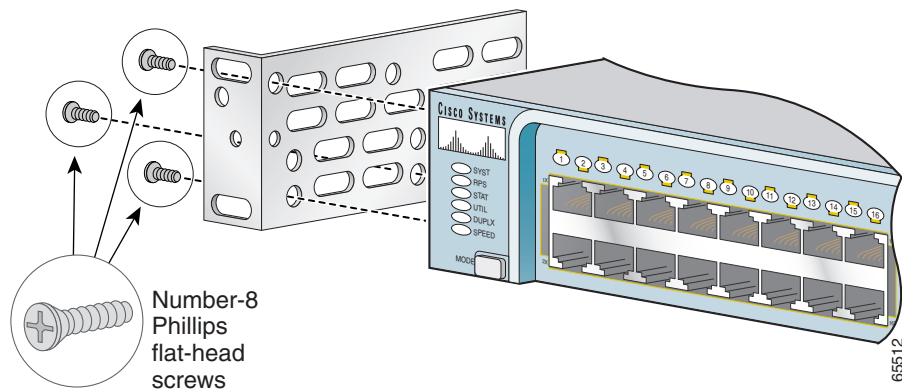
*Figure 2-5   Attaching Brackets on a Catalyst 2950G-48-EI, Catalyst 2950SX-48-SI, or Catalyst 2950T-48-SI Switch in a 19-Inch Rack (Rear Panel Forward)*

CONSOLE

Number-8
Phillips
flat-head
screws

65513
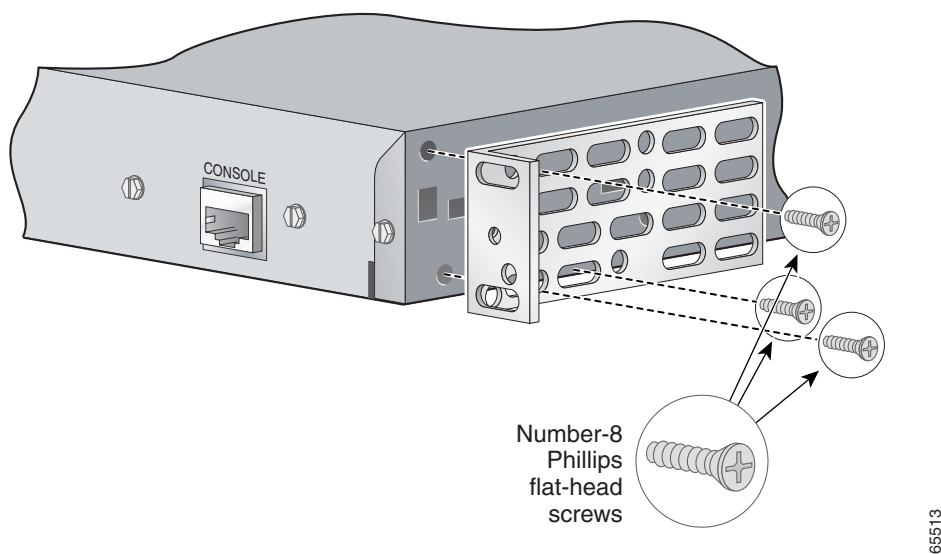
Figure 2-6   Attaching Brackets on a Catalyst 2950G-48-EI, Catalyst 2950SX-48-SI, or Catalyst 2950T-48-SI Switch in a 19-Inch Telco Rack


Number-8
Phillips
flat-head
screws

65514
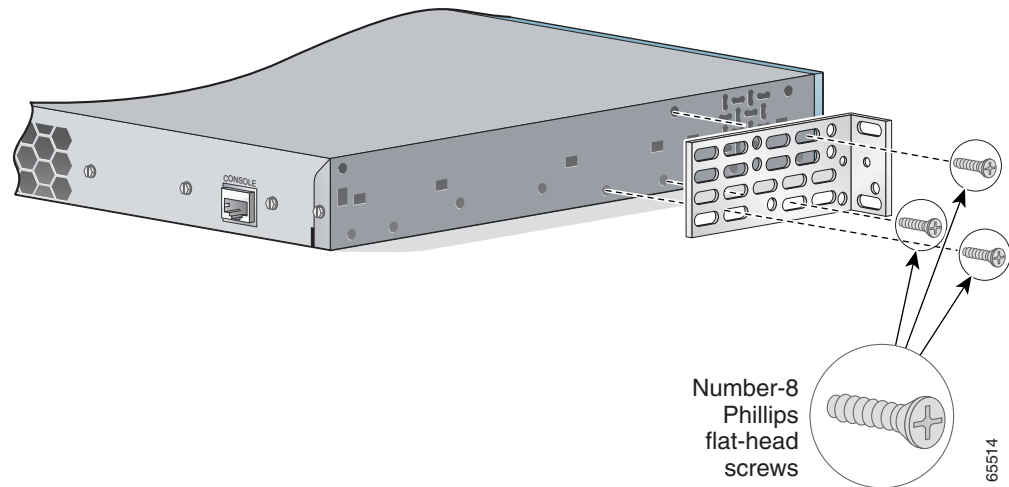
Figure 2-7   Attaching Brackets on the Catalyst 2950G-24-EI-DC or 2950ST-24 LRE 997 Switch in a 23-Inch Telco Rack (Front Panel Forward)

Number-8
Phillips
truss-head
screws

65673

Figure 2-8   Attaching Brackets on the Catalyst 2950G-24-EI-DC or 2950ST-24 LRE 997 Switch in a 23-Inch Telco Rack (Rear Panel Forward)

Number-8
Phillips
truss-head
screws

65674

Figure 2-9   Attaching Brackets on the Catalyst 2950G-24-EI-DC or 2950ST-24 LRE 997 Switch in a 23-Inch Telco Rack

Number-8
Phillips
truss-head
screws

65675

Figure 2-10   Attaching Brackets on the Switch in a 24-Inch Rack (Front Panel Forward)
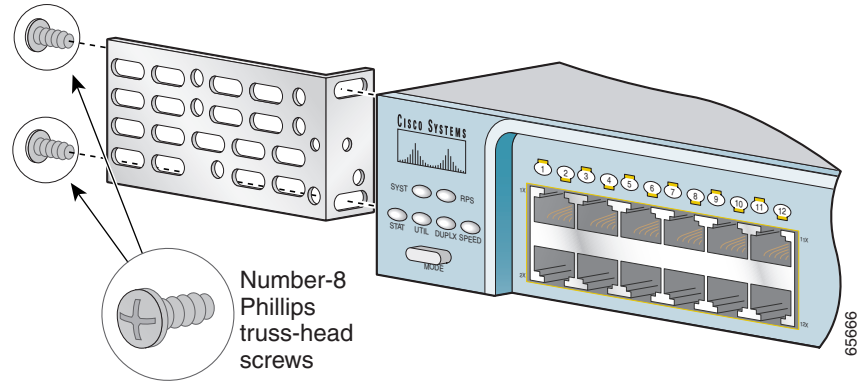
Figure 2-11   Attaching Brackets on the Switch in a 24-Inch Rack (Rear Panel Forward)
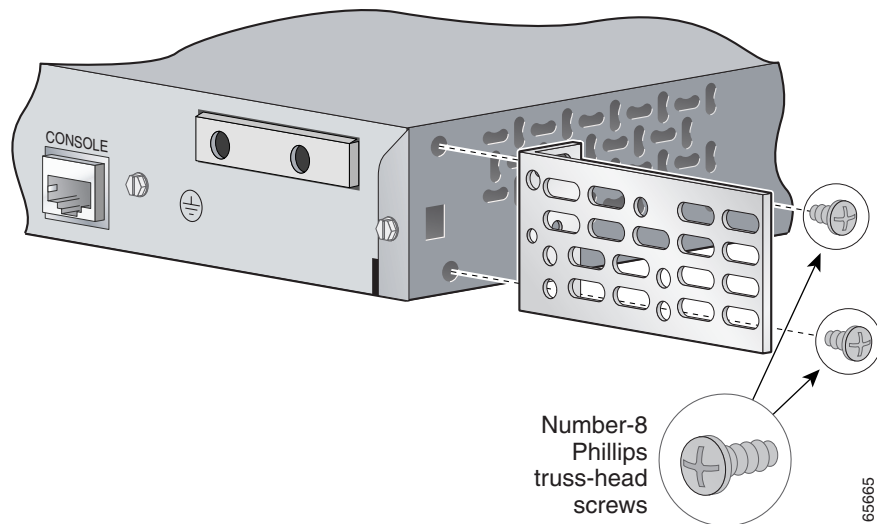
Figure 2-12   Attaching Brackets on the Switch in a 24-Inch Telco Rack
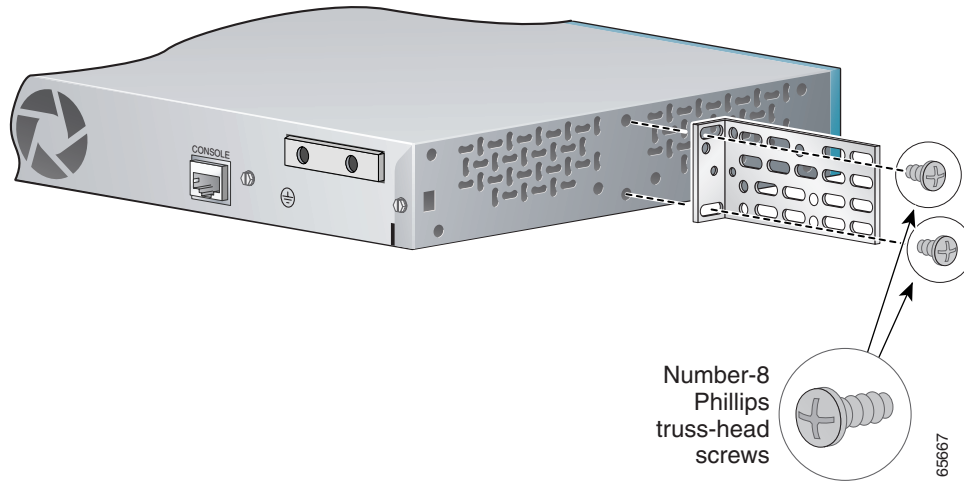
Figure 2-13   Attaching Brackets on a Catalyst 2950G-48-EI, Catalyst 2950SX-48-SI, or Catalyst 2950T-48-SI Switch in a 24-Inch Rack (Front Panel Forward)
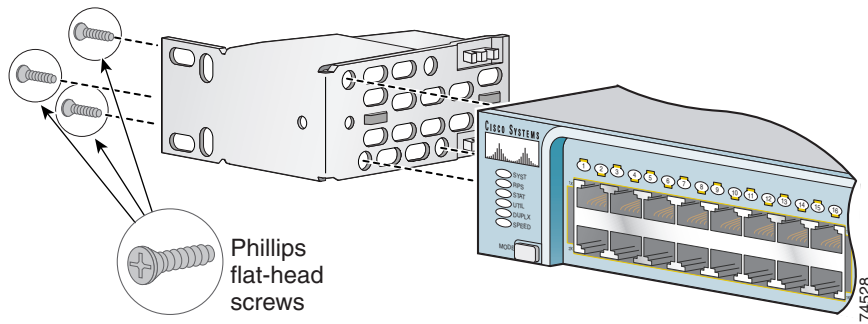
Figure 2-14   *Attaching Brackets on a Catalyst 2950G-48-EI, Catalyst 2950SX-48-SI, or Catalyst 2950T-48-SI Switch in a 24-Inch Rack (Rear Panel Forward)*
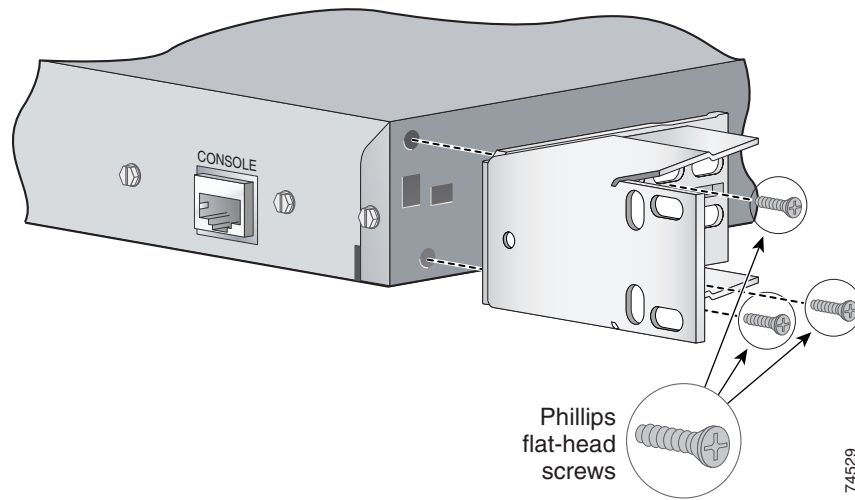
Figure 2-15   *Attaching Brackets on a Catalyst 2950G-48-EI, Catalyst 2950SX-48-SI, or Catalyst 2950T-48-SI Switch in a 24-Inch Telco Rack*
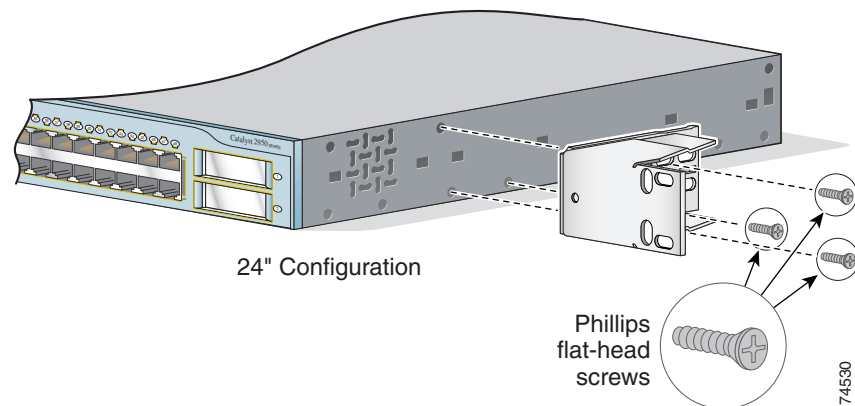
Mounting the Switch in a Rack

After attaching the brackets, use the four Phillips machine screws to securely attach the brackets to the rack, as shown in Figure 2-16.

When installing a switch other than an LRE switch, to prevent the cables from obscuring the switch and other devices in the rack, you can also attach the cable guide to the rack. See the "Attaching the Optional Cable Guide" section for instructions.

Figure 2-16   Mounting the Switch in a Rack

Number-12
Phillips machine
screws
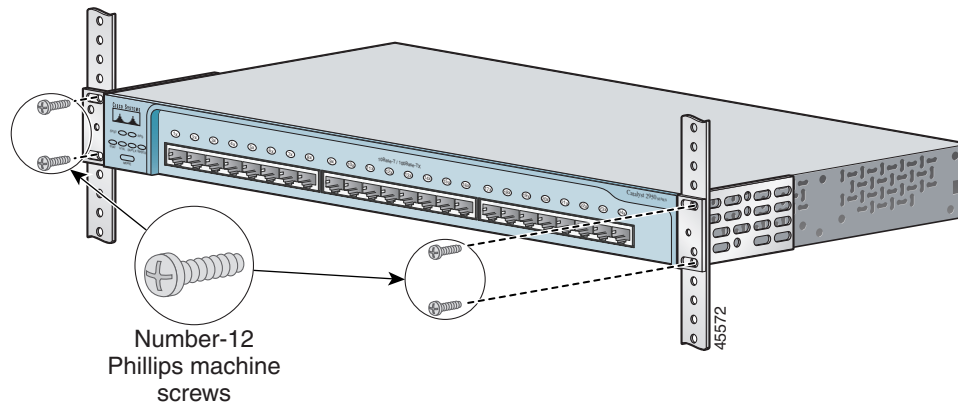
After mounting the switch in the rack, start the terminal-emulation software, and provide power to the switch. See the getting started guide for instructions.

Attaching the Optional Cable Guide

We recommend attaching the cable guide to prevent the cables from obscuring the front panels of the switch and other devices installed in the rack. Use the supplied black Phillips machine screw to attach the cable guide to the left or right bracket, as shown in Figure 2-17.

Note   You cannot use the cable guide with Catalyst 2950 LRE switches.

Figure 2-17   Attaching the Cable Guide

Cable guide screw
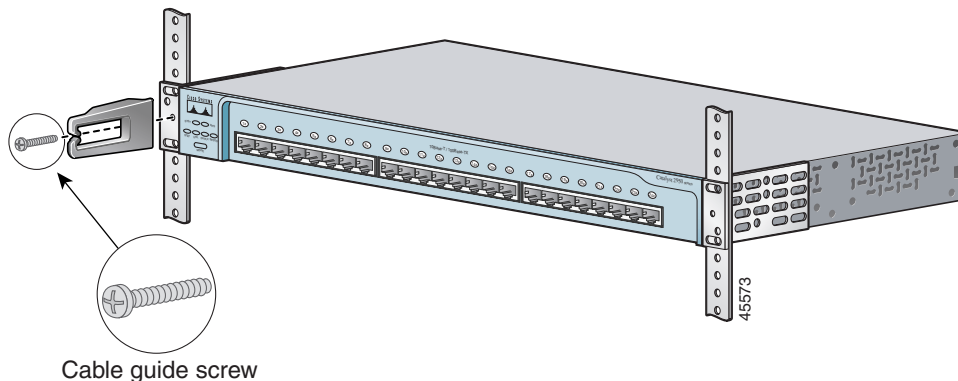
Installing the Switch on a Table, Shelf, or Desk

Before placing the switch on a table, shelf, or desk, locate the adhesive strip with rubber feet in the mounting-kit envelope, and attach four rubber feet to the recessed areas on the switch bottom. Place the switch on a table, shelf, or desk near an AC power source or DC-input power source.

Start the terminal-emulation software and provide power to the switch. See the getting started guide for instructions.

Installing the Switch on a Wall

⚠ **Warning**   **To comply with safety regulations, mount switches on a wall with the front panel facing up.** Statement 266

⚠ **Warning**   **If an RPS is not connected to the switch, install an RPS connector cover on the back of the switch.** Statement 265

You can mount the Catalyst 2950 switch to a wall in a face-up configuration. To attach the switch to a wall, follow the procedures in this section.

1. Attaching the Brackets to the Switch, page 2-17

2. Attaching the RPS Connector Cover, page 2-18

3. Mounting the Switch to a Wall, page 2-18

Attaching the Brackets to the Switch

Use the supplied Phillips flat-head screws to attach a bracket to the switch. Figure 2-18 shows how to attach the bracket to one side of the switch. Follow the same steps to attach the second bracket to the opposite side of the switch.

Figure 2-18   Attaching Brackets for Wall-Mounting for the Catalyst 2950 Switch

Phillips truss-head screws

47303
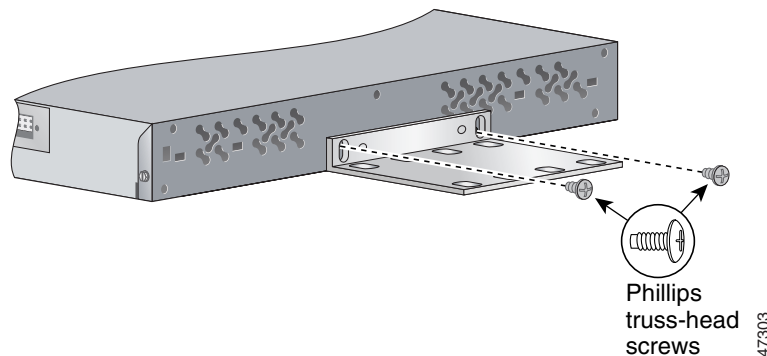
Attaching the RPS Connector Cover

If you are not using an RPS with your switch, use two number-4 Phillips pan-head screws to install an RPS connector cover to the back of the switch. (See Figure 2-19.) The pan-head screws are included in the accessory kit.

Warning   **If an RPS is not connected to the switch, install an RPS connector cover on the back of the switch.** Statement 265

Figure 2-19   Attaching the RPS Connector Cover

RPS connector cover

RPS connector
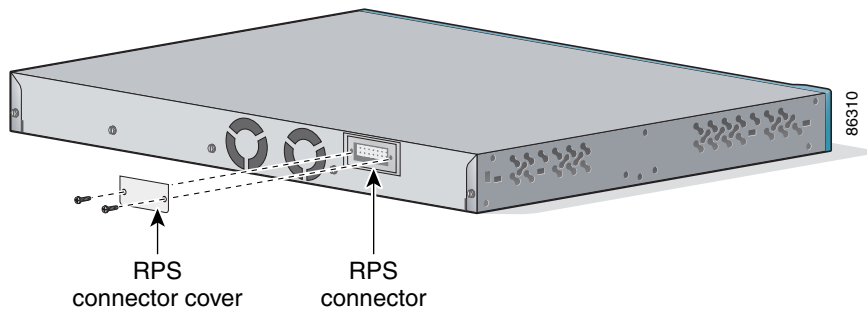
Mounting the Switch to a Wall

Warning   **To comply with safety regulations, mount switches on a wall with the front panel facing up.** Statement 266

For the best support of the switch and cables, make sure the switch is attached securely to a wall stud or to a firmly attached plywood mounting backboard, as shown in Figure 2-20.

Figure 2-20   Mounting a Catalyst 2950 Switch to a Wall
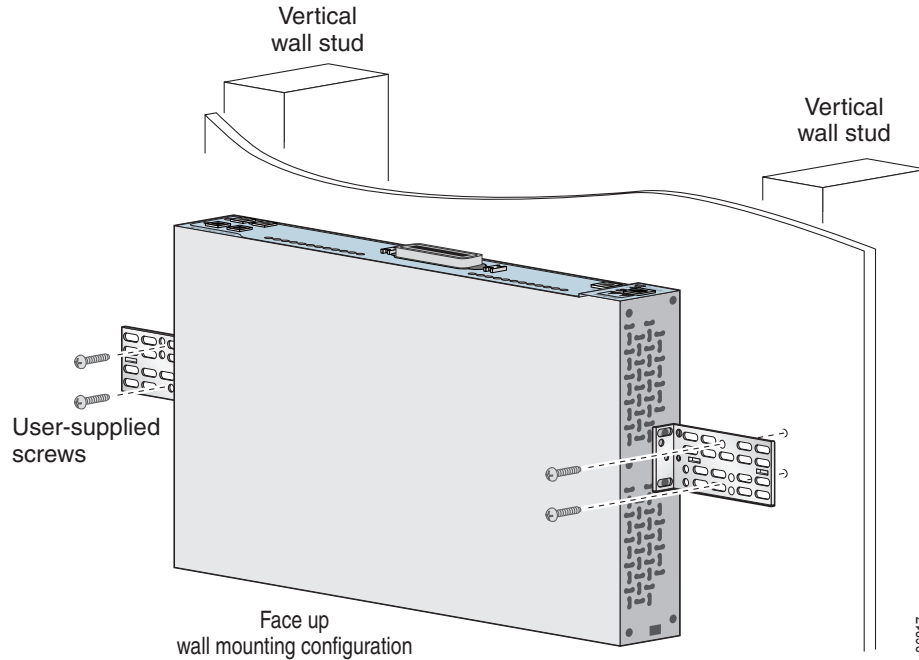
After the switch is mounted on the wall, power the switch as described in getting started guide.

Installing the Optional AC Ground Kit for Catalyst 2950 Switches

For switches that require a two-hole lug for grounding, you can order a kit containing the ground lug and hardware (Cisco part number NEBS-LUG-3550=).

**Note**   When you install the ground-lug kit, you cannot connect an RPS to the switch.

To install the ground lug, you need these tools and equipment:

- Ratcheting torque screwdriver with a Phillips head that exerts up to 15 pound-force inches (lbf-in.) or 240 ounce-force inches (ozf-in.) of pressure
- Panduit crimping tool with optional controlled-cycle mechanism (model CT-700, CT-720, CT-920, CT-920CH, CT-930, or CT-940CH)
- 6-gauge copper ground wire (insulated or noninsulated)
- Wire-stripping tool for stripping 6-gauge wires

To ground the switch to earth ground, follow these steps. Make sure to follow any grounding requirements at your site.

Step 1   Use the two Phillips pan-head screws to attach the RPS connector cover to the back of the switch as shown in Figure 2-21.
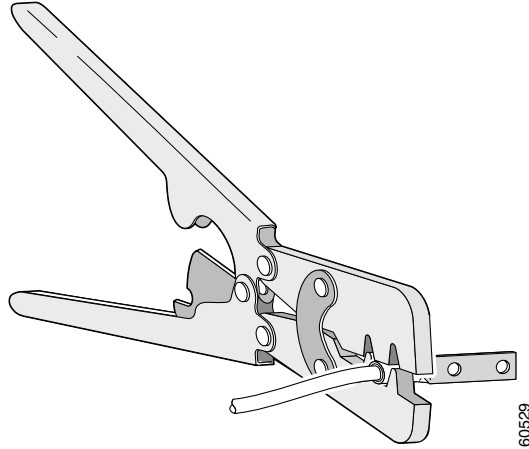
Figure 2-21   Attaching the RPS Connector Cover
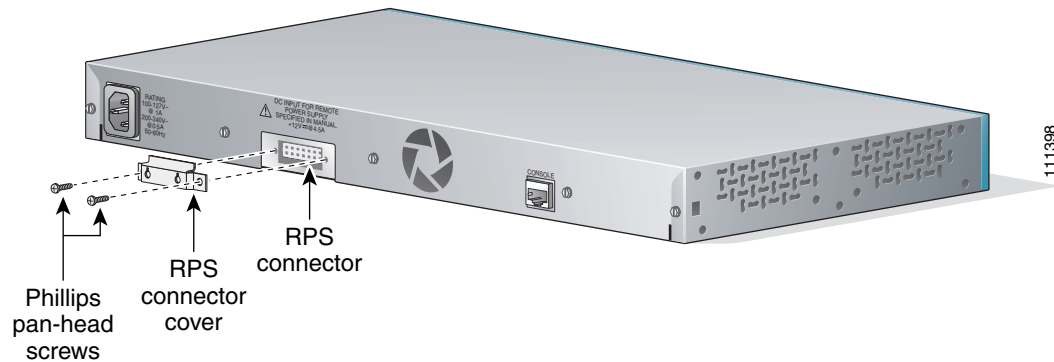
Step 2   If your ground wire is insulated, use a wire stripping tool to strip the 6-gauge ground wire to 0.5 inch (12.7 mm) ± 0.02 inch (0.5 mm), as shown in Figure 2-22.

Figure 2-22   Stripping the Ground Wire
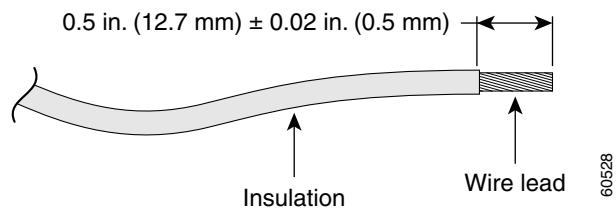
Step 3   Slide the open end of the ground lug over the exposed area of the 6-gauge wire.

Step 4   Using a Panduit crimping tool, crimp the ground lug to the 6-gauge wire, as shown in Figure 2-23.

Figure 2-23   Crimping the Ground Lug

Step 5   Use the two number-10-32 screws to attach the ground lug and wire assembly to the switch rear panel RPS connector cover, as shown in Figure 2-24.

Step 6   Using a ratcheting torque screwdriver, torque each ground-lug screw to 15 lbf-in. (240 ozf-in.)

Figure 2-24   Torquing Ground-Lug Screws

Torque to 15 lbf-in.
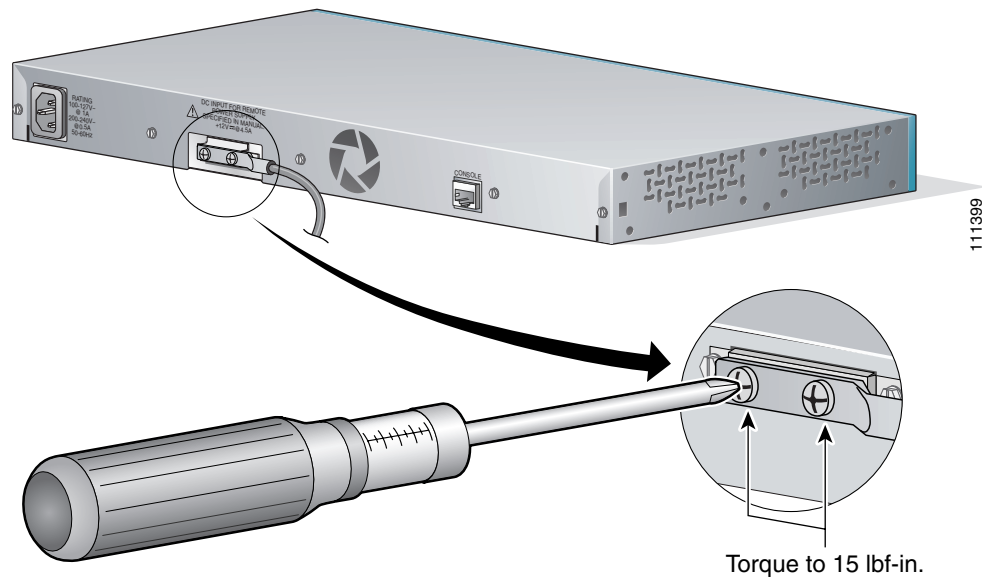
Installing the GBIC Modules

Figure 2-25, Figure 2-26, and Figure 2-27 show how to insert a GBIC module in a GBIC module slot on the switch. For instructions on how to install a CWDM GBIC module in a GBIC module slot, see the documentation that came with that GBIC module.

For detailed instructions on installing, removing, and cabling the GBIC module (the 1000BASE-X module, the 1000BASE-T module, the CWDM GBIC module, or the GigaStack module), refer to your GBIC documentation.

⚠

Caution   To prevent electrostatic-discharge (ESD) damage when installing GBIC modules, follow your normal board and component handling procedures.

Figure 2-25   Installing a 1000BASE-X GBIC Module in a Switch
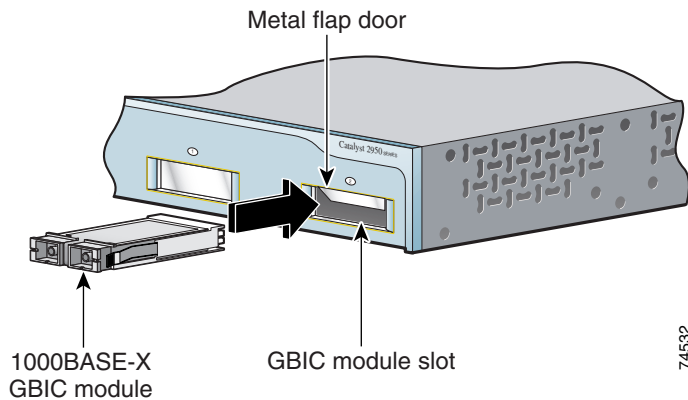
Figure 2-26   Installing a 1000BASE-T GBIC Module in a Switch
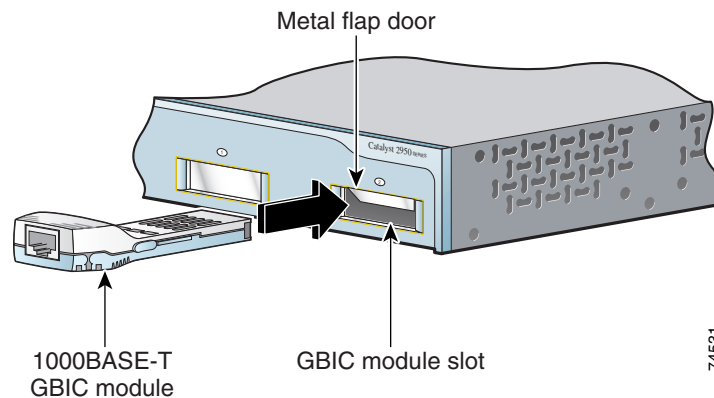
Figure 2-27   Installing a GigaStack GBIC Module in a Switch

Metal flap door

GigaStack
GBIC module

GBIC module slot

74533
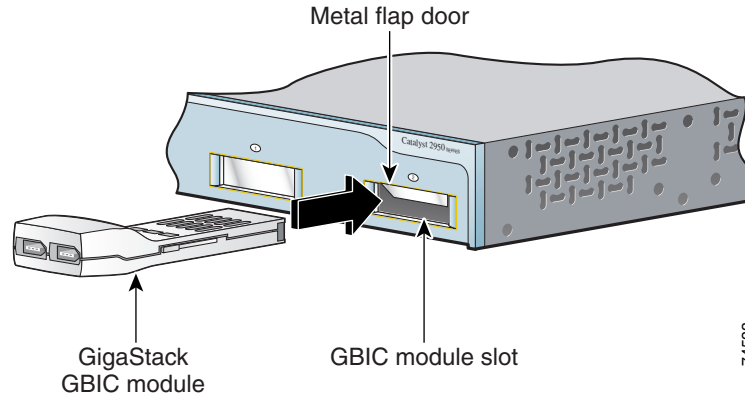
Installing and Removing SFP Modules

These sections describe how to install and remove small-form-factor pluggable (SFP) modules.
SFP modules are inserted into SFP module slots on the front of the Catalyst 2950 LRE switches. These field-replaceable modules provide the uplink interfaces.

You can use any combination of SFP modules. See the Catalyst 2950 LRE release notes for the list of SFP modules that the Catalyst 2950 LRE switch supports. Each port must match the wave-length specifications on the other end of the cable, and for reliable communications, the cable must not exceed the stipulated cable length. Refer to Table 1-2 for cable stipulations for SFP module connections.

Use only Cisco SFP modules on the Catalyst 2950 LRE switch. 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 switch.

For detailed instructions on installing, removing, and cabling the SFP module, refer to your SFP module documentation.

## Installing SFP Modules into SFP Module Slots

SFP modules use different types of latches for their installation and extraction. Determine which type of latch your SFP module uses before following the installation procedure:

- Figure 2-28 shows an SFP module with a Mylar tab latch.
- Figure 2-29 shows an SFP module with an actuator button latch.
- Figure 2-30 shows an SFP module that has a bale-clasp latch.

⚠

Caution   We strongly recommend that you do not install or remove the SFP module with fiber-optic cables attached to it because of the potential damage to the cables, the cable connector, or the optical interfaces in the SFP module. Disconnect all cables before removing or installing an SFP module.

Removing and installing an SFP module can shorten its useful life. Do not remove and insert SFP modules more often than is absolutely necessary.

Figure 2-28   SFP Module with a Mylar Tab Latch
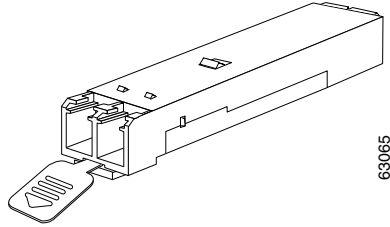
Figure 2-29   SFP Module with an Actuator Button Latch
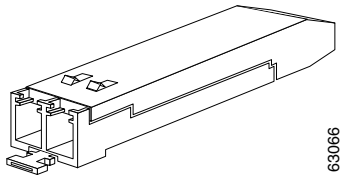
Figure 2-30   SFP Module with a Bale-Clasp Latch
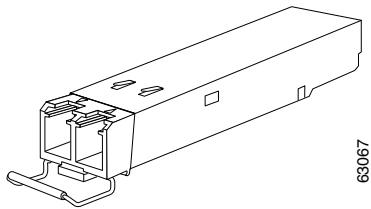
To insert an SFP module into the SFP module slot, follow these steps:

Step 1   Attach an ESD-preventive wrist strap to your wrist and to a bare metal surface on the chassis.

**Step 2**   Find the send (TX) and receive (RX) markings that identify the top side of the SFP module.

> **Note**   On some SFP modules, the send and receive (TX and RX) markings might be replaced by arrows that show the direction of the connection, either send or receive (TX or RX).

Step 3   Align the SFP module in front of the slot opening.

Step 4   Insert the SFP module into the slot until you feel the connector on the module snap into place in the rear of the slot.

Figure 2-31   Installing an SFP Module into an SFP Module Slot
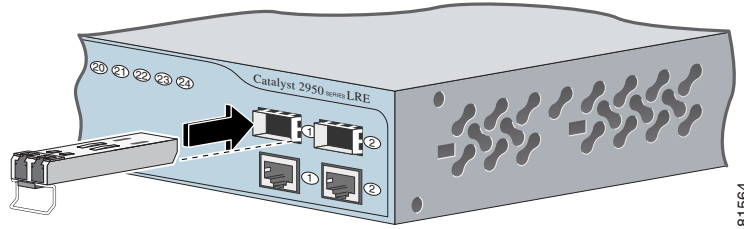
Step 5 For fiber-optic SFP modules, remove the dust plugs from the SFP module optical ports and store them for later use.

⚠

Caution Do not remove the dust plugs from the SFP module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP module ports and cables from contamination and ambient light.

Step 6 Insert the cable connector into the SFP module:

- For fiber-optic SFP modules, insert the LC or MT-RJ cable connector into the SFP module.
- For copper SFP modules, insert the RJ-45 cable connector into the SFP module.

✎

Note When connecting to 1000BASE-T SFP modules, be sure to use a twisted four-pair, Category 5 cable.

Removing SFP Modules from SFP Module Slots

To remove an SFP module from a module receptacle, follow these steps:

Step 1 Attach an ESD-preventive wrist strap to your wrist and to a bare metal surface on the chassis.

**Step 2** Disconnect the LC from the SFP module.

🔎

**Tip** For reattachment, note which cable connector plug is send (TX) and which is receive (RX).

Step 3 For fiber-optic SFP modules, insert a dust plug into the optical ports of the SFP module to keep the optical interfaces clean.

Step 4 Unlock and remove the SFP module, as shown in Figure 2-32, Figure 2-33, and Figure 2-34.

- If the module has a Mylar tab latch, pull the tab straight out so that you remove the SFP module from the port in a parallel direction. Do not twist or pull the tab because you could disconnect it from the SFP module.

Figure 2-32   Using the Mylar Tab Latch to Remove an SFP Module from a Slot
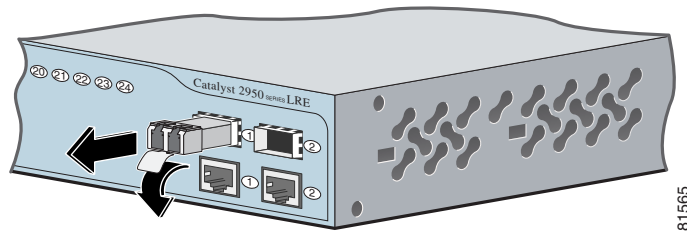
- If the module has an actuator button latch, use your thumb to push inward on the wedge to free the locking pin, and use your index finger to grip the ridge on top of the SFP module. Pull straight out to remove the module.

Figure 2-33   Using the Actuator Button Latch to Remove an SFP Module from an SFP Module Slot
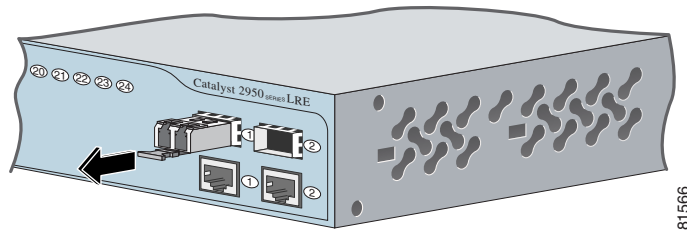
- If the module has a bale-clasp latch, pull the bale out and down to eject the module. If the bale-clasp latch is obstructed and you cannot use your index finger to open it, use a small, flat-blade screwdriver or other long, narrow instrument to open the bale-clasp latch.

Figure 2-34   Removing a Bale-Clasp Latch SFP Module by Using a Flat-Blade Screwdriver

Bale clasp
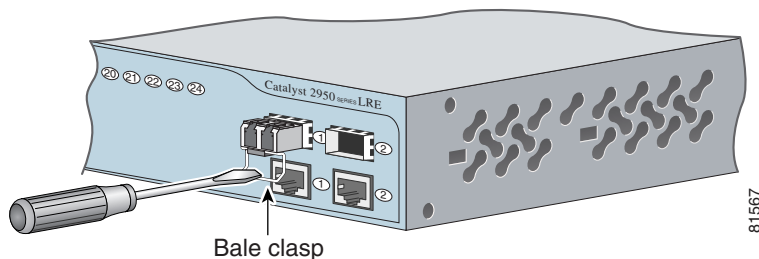
Step 5   Grasp the SFP module between your thumb and index finger, and carefully remove it from the module slot.

Step 6   Place the removed SFP module in an antistatic bag or other protective environment.

Connecting to 10/100 and 10/100/1000 Ports

The 10/100 ports configure themselves to operate at the speed and duplex settings of attached devices.They operate at 10 or 100 Mbps in half- or full-duplex mode. If the attached devices do not support autonegotiation, you can explicitly set the speed and duplex parameters.

The 10/100/1000 ports configure themselves to operate at the speed setting of attached devices. These ports on Catalyst 2950T-24 switches operate at 10, 100, or 1000 Mbps in full-duplex mode. The 10/100/1000 ports on Catalyst 2950 LRE and Catalyst 2950T-48-SI switches operate at 10 or 100 Mbps in either half- or full-duplex mode and at 1000 Mbps only in full-duplex mode. If the attached devices do not support autonegotiation, you can set the speed.

Note   On the Catalyst 2950 LRE switches, the four input uplink ports are bundled as two logical ports, each consisting of a copper 10/100/1000 port and a fiber-optic SFP module slot, respectively.

Within each logical port, you can use only the copper or the fiber-optic port at one time. If the Catalyst 2950 LRE switch senses more than two connections for both logical ports, by default, the switch chooses the fiber-optic connections over the copper connections.

See the "SFP Module Slots" section on page 1-11 for more information on LRE uplink logical ports.

Connecting devices that do not autonegotiate or devices with manually set speed and duplex parameters can reduce performance or result in link failures between the devices. To maximize performance, choose one of these methods for configuring the ports:

- Let the 10/100 ports autonegotiate both speed and duplex, let the 10/100/1000 ports on the LRE switches autonegotiate both speed and duplex, and let the 10/100/1000 ports on the Catalyst 2950G-24-EI-DC switch only autonegotiate speed.

- Set the speed and duplex parameters on both ends of the connection.

When connecting the ports on the Catalyst 2950G-24-EI-DC and Catalyst 2950ST-24 LRE 997 switches to other devices, follow these guidelines:

Caution   To comply with the intrabuilding lightning surge requirements, intrabuilding wiring must be shielded, and the shield for the wiring must be grounded at both ends.

Caution   The Catalyst 2950G-24-EI-DC or Catalyst 2950ST-24 LRE 997 switch is suitable only for intrabuilding or nonexposed wiring connections.

Follow these steps to connect the switch to 10BASE-T, 100BASE-TX, or 1000BASE-T devices:

Caution   To prevent electrostatic-discharge (ESD) damage, follow your normal board and component handling procedures.

Step 1 When connecting to servers, workstations, and routers, insert a twisted-pair straight-through cable in a front-panel RJ-45 connector. Figure 2-35 shows the Catalyst 2950-12, 2950-24, 2950C-24, 2950SX-24, and 2950T-24 switch as an example. When connecting to switches or repeaters, insert a twisted-pair crossover cable. (See the "Cable and Adapter Specifications" section on page B-6 for cable-pinout descriptions.)

✎

Note   When connecting to 1000BASE-T devices, be sure to use a four twisted-pair, Category 5 cable.

Figure 2-35 Connecting to a Port on Catalyst 2950-12, 2950-24, 2950C-24, 2950SX-24, and 2950T-24 Switches
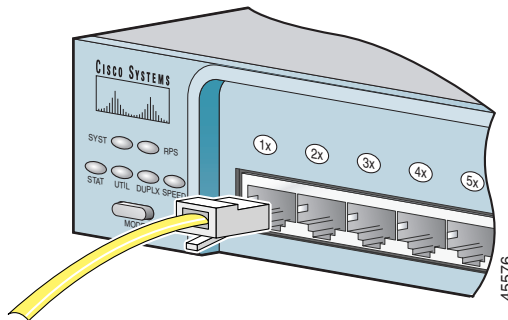
Step 2 Insert the other cable end in an RJ-45 connector on the target device.

Step 3 Observe the port status LED.

The LED turns green when the switch and the target device have an established link.

The LED turns amber while Spanning Tree Protocol (STP) discovers the network topology and searches for loops. This process takes about 30 seconds, and then the LED turns green.

If the LED is off, the target device might not be turned on, there might be a cable problem, or there might be a problem with the adapter installed in the target device. See Chapter 3, "Troubleshooting," for solutions to cabling problems.

Step 4 Reconfigure and restart the target device if necessary.

Step 5 Repeat Steps 1 through 4 to connect each port.

Connecting to 100BASE-FX and 1000BASE-SX Ports

The 100BASE-FX and 1000BASE-SX ports operate only in full-duplex mode.

You can connect a 100BASE-FX or 1000BASE-SX port to an SC or ST port on a target device by using one of the MT-RJ fiber-optic patch cables listed in Table 2-1. Use the Cisco part numbers in Table 2-1 to order the patch cables that you need.

Table 2-1   MT-RJ Patch Cables for 100BASE-FX and 1000BASE-SX Connections

Type	Cisco Part Number
1-meter, MT-RJ-to-SC multimode cable	CAB-MTRJ-SC-MM-1M
3-meter, MT-RJ-to-SC multimode cable	CAB-MTRJ-SC-MM-3M
5-meter, MT-RJ-to-SC multimode cable	CAB-MTRJ-SC-MM-5M
1-meter, MT-RJ-to-ST multimode cable	CAB-MTRJ-ST-MM-1M
3-meter, MT-RJ-to-ST multimode cable	CAB-MTRJ-ST-MM-3M
5-meter, MT-RJ-to-ST multimode cable	CAB-MTRJ-ST-MM-5M

⚠ **Caution**   Do not remove the dust plugs from the fiber-optic ports or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the fiber-optic ports and cables from contamination and ambient light.

Follow these steps to connect the switch to a 100BASE-FX or 1000BASE-SX device:

Step 1   Remove the dust plugs from the 100BASE-FX or 1000BASE-SX port and the rubber caps from the MT-RJ patch cable. Store them for future use.

Step 2   Insert the cable in a 100BASE-FX or 1000BASE-SX port. (See Figure 2-36.)

Figure 2-36   Connecting to a 100BASE-FX or 1000BASE-SX Port

MT-RJ patch cable   Dust plug
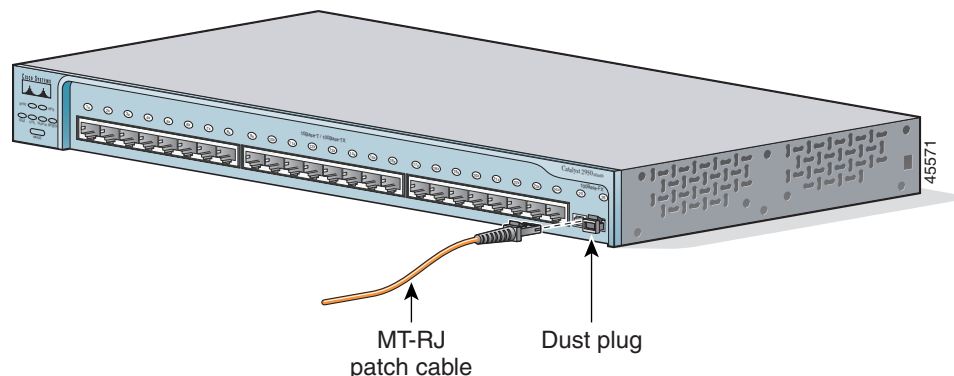
Step 3   Insert the other cable end in an SC or ST port on the target device.

Step 4   Observe the port status LED.

The LED turns green when the switch and the target device have an established link.

The LED turns amber while STP discovers the network topology and searches for loops. This process takes about 30 seconds, and then the port LED turns green.

If the LED is off, the target device might not be turned on, there might be a cable problem, or there might be a problem with the adapter installed in the target device. See Chapter 3, "Troubleshooting," for solutions to cabling problems.

Step 5   Reconfigure and restart the target device if necessary.

Step 6   Repeat Steps 1 through 5 to connect each port.

Connecting to an LRE Port

Depending on the switch model, you can connect the LRE port to up to 8 or up to 24 LRE customer premises equipment (CPE) devices through a patch panel. For information about which LRE CPE devices are supported by the LRE switches, see Table 1-1 on page 1-3.

Note   You can connect both Cisco 575 LRE CPE and Cisco 585 LRE CPE devices to your Catalyst 2950ST-8 LRE or Catalyst 2950ST-24 LRE switch.

You can connect only the Cisco 576 LRE CPE 997 device to LRE ports on a Catalyst 2950ST-24 LRE 997 switch.

You can hot swap the CPE devices without powering down the switch or disrupting the other switch ports.

Connection Guidelines

If telephone services, such as voice or Integrated Services Digital Network (ISDN), use the same cabling as the LRE traffic, you must connect the LRE to a plain old telephone service (POTS) splitter. The splitter routes LRE data (high-frequency) and voice (low-frequency) traffic from the telephone line to the switch and private branch exchange (PBX) switch or public switched telephone network (PSTN).

If the other telephone services are connected through a PBX switch, you can use a Cisco LRE 48 POTS Splitter. The PBX routes voice traffic to private telephone networks and the PSTN. For more information about the Cisco LRE 48 POTS Splitter (PS-1M-LRE-48), see the *Installation and Warranty Notes for the Cisco LRE 48 POTS Splitter*.

If the installation does not have a PBX, you need to use a homologated POTS splitter to connect to the PSTN. For more information about homologated POTS splitters, contact your Cisco sales representative.

If a connection to a telephone network is not required, you do not need a splitter, and you can connect the switch to the patch panel.

Limitations and Restrictions with POTS Splitters

These limitations and restrictions apply when you use a POTS splitter with Catalyst 2950 LRE switches and Cisco LRE CPE devices:

- The Catalyst 2950ST-8 LRE switch, Catalyst 2950ST-24 LRE switch, Cisco 575 LRE CPE, and Cisco 585 LRE CPE are designed to share lines with analog, ISDN, and digital PBX switch telephones that use the 0 to 700 kHz frequency range.

  Digital telephones connected to digital PBX switches that use frequencies above 700 kHz do not work when sharing a line with LRE signals. Due to the proprietary nature of digital PBX switches, some digital PBX switch services use frequencies above 700 kHz.

- You can use a Cisco LRE 48 POTS Splitter with a Catalyst 2950ST-8 LRE switch, Catalyst 2950ST-24 LRE switch, Cisco 575 LRE CPE, and Cisco 585 LRE CPE. For installation instructions, see the *Installation and Warranty Notes for the Cisco LRE 48 POTS Splitter.*

- The Catalyst 2950ST-24 LRE 997 switch and Cisco 576 LRE 997 CPE are designed to share lines with analog and ISDN telephones that use the 0 to 120 kHz frequency range.

- We recommend that *you do not use* a Cisco LRE 48 POTS Splitter with a Catalyst 2950ST-24 LRE 997 switch and a Cisco 576 LRE 997 CPE as shown in Figure 2-37. Only traffic in a specific frequency range can be sent to and from the devices attached to the CPE.

  In Figure 2-37, only traffic from 0 to 120 kHz can pass from a device attached to the CPE, such as a computer or telephone, to the CPE, a splitter, and a switch. In the reverse direction, traffic from 0 to 700 kHz can pass through the switch and splitter to the CPE, but only traffic from 0 to 120 kHz can pass through the CPE to a computer or a telephone.

  For more information, see the *Installation and Warranty Notes for the Cisco LRE 48 POTS Splitter.*

Figure 2-37   Limitations Using a Cisco LRE 48 POTS Splitter with a Catalyst 2950ST-24 LRE 997 Switch and a Cisco 576 LRE 997 CPE
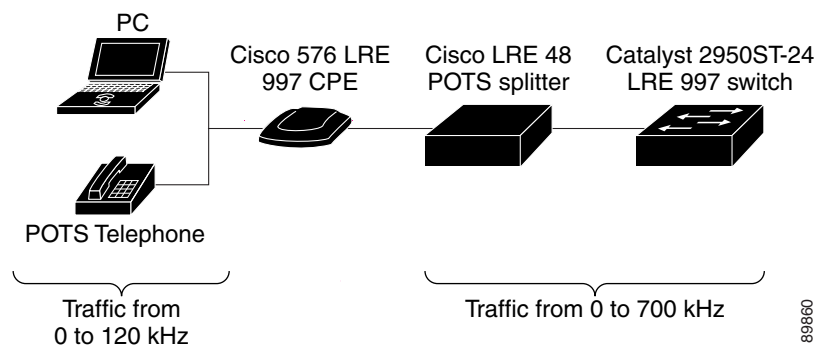
Required Cables

Connecting the LRE port to a patch panel or a POTS splitter requires a male-to-male RJ-21 cable, Category 3 or above. You can order RJ-21 cables from your cable vendor, or you can order these cables from your Cisco sales representative:

- CAB-5-M120M120-5= (Category 5 cable with 90-degree, male-to-male RJ-21 connectors)
- CAB-5-M180M120-5= (Category 5 cable with 120-degree, male-to-male RJ-21 connectors)

The screws that you need to secure the cable to the switch are shipped with the cable. Contact your Cisco sales representative for more information.

Connecting to a Patch Panel or POTS Splitter

To connect the LRE port to a patch panel or POTS splitter, follow these steps:

Step 1   Connect one end of a cable connected to the wiring trunk to the RJ-21 connector (the LRE port) on the switch. (See Figure 2-38 and Figure 2-39.)

Step 2   Referring to Figure 2-38 and Figure 2-39, secure the cable to the switch:

- For a 90-degree connector, see the top of Figure 2-38 and Figure 2-39.
- For a 12-degree connector, see the bottom of Figure 2-38 and Figure 2-39.

Note   The cable tie is not included with the connector and cable assembly.

Step 3   Connect the other end of the cable to the patch panel or POTS splitter.

Figure 2-38   Connecting to an LRE Port on a Catalyst 2950ST-8 LRE or 2950ST-24 LRE Switch
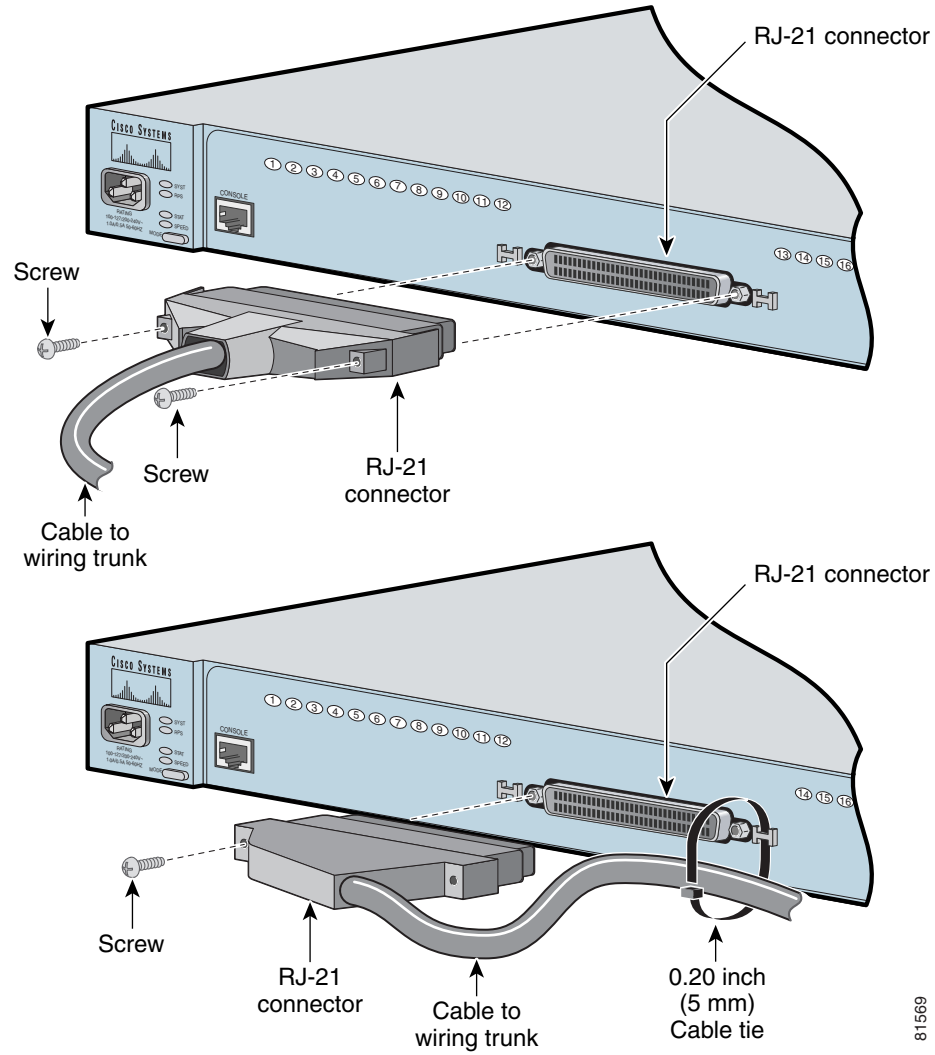
Figure 2-39   Connecting to an LRE Port on a Catalyst 2950ST-24 LRE 997 Switch
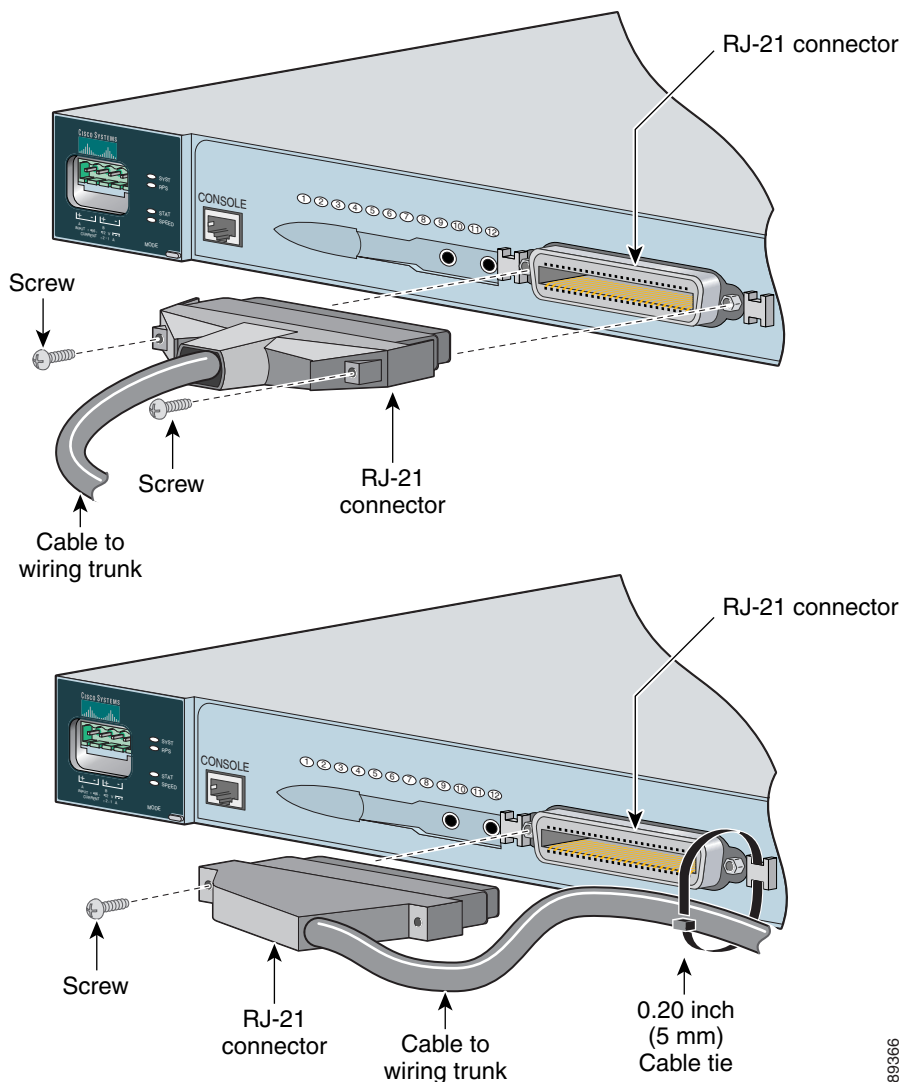
Each LRE port status LED turns on when it establishes a link with a Cisco LRE CPE device. For more information about the LRE link between the switch LRE port and the CPE and about the configuration and management of CPE devices, see the switch software configuration guide.

For more information about the Cisco LRE CPE devices, see the *Cisco LRE CPE Hardware Installation Guide.*

Connecting to GBIC Module Ports

These sections describe how to connect to a GBIC module port.

For instructions about how to connect to the CWDM GBIC module ports, see the documentation that came with that GBIC module.

For detailed instructions about installing, removing, and connecting to the GBIC module (the 1000BASE-X module, the 1000BASE-T module, the CWDM GBIC module, or the GigaStack module), see the GBIC module documentation.

When connecting the ports on the Catalyst 2950G-24-EI-DC and Catalyst 2950ST-24 LRE 997 switches to other devices, follow these guidelines:

⚠

Caution   To comply with the intrabuilding lightning surge requirements, intrabuilding wiring must be shielded, and the shield for the wiring must be grounded at both ends.

⚠

Caution   The Catalyst 2950G-24-EI-DC or Catalyst 2950ST-24 LRE 997 switch is suitable only for intrabuilding or nonexposed wiring connections.

Connecting to 1000BASE-X GBIC Module Ports

⚠

Caution   Do not remove the rubber plugs from the GBIC module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the GBIC module ports and cables from contamination and ambient light.

After installing the 1000BASE-X GBIC in the GBIC module slot, follow these steps:

Step 1   Remove the rubber plugs from the GBIC module port, and store them for future use.

Step 2   Insert the SC connector in the fiber-optic receptacle (see Figure 2-40).

Figure 2-40   Connecting to a 1000 BASE-X GBIC Port
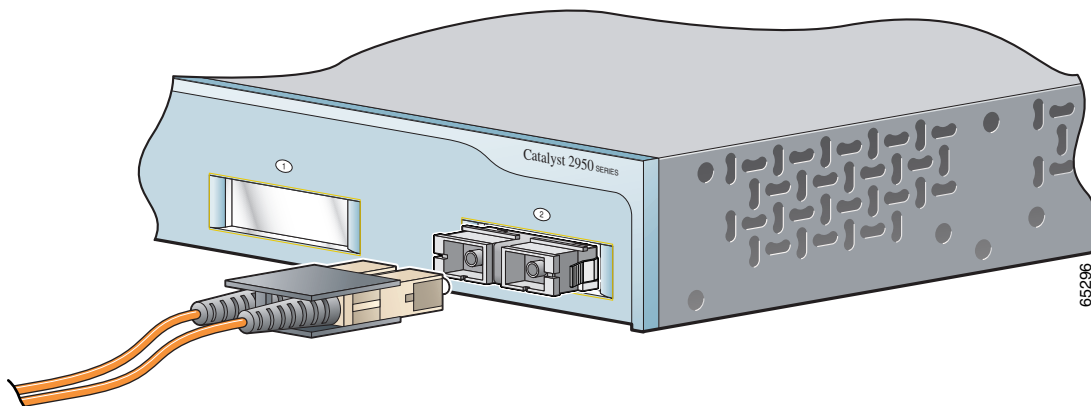
Step 3   Insert the other cable end in a fiber-optic receptacle on a target device.

Step 4   Observe the port status LED.

The LED turns green when the switch and the target device have an established link.

The LED turns amber while STP discovers the network topology and searches for loops. This process takes about 30 seconds, and then the port LED turns green.
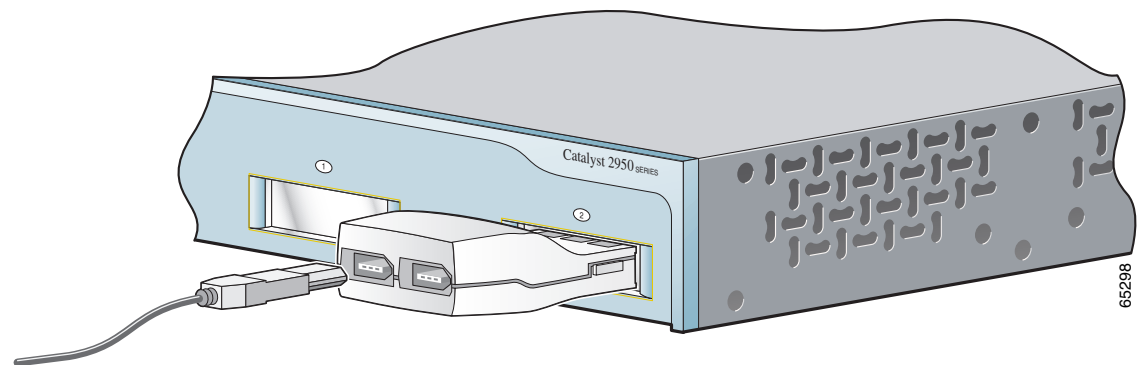
If the LED is off, the target device might not be turned on, there might be a cable problem, or there might be problem with the adapter installed in the target device. See Chapter 3, "Troubleshooting," for solutions to cabling problems.

Step 5   Reconfigure and restart the switch or target device if necessary.

Connecting to 1000BASE-T GBIC Module Ports

After installing the 1000BASE-T GBIC in the GBIC module slot, follow these steps:

⚠
Caution   To prevent ESD damage, follow your normal board and component handling procedures.

Step 1   When connecting to servers, workstations, and routers, insert a four twisted-pair, straight-through cable in the RJ-45 connector. When connecting to switches or repeaters, insert a four twisted-pair, crossover cable (see Figure 2-41).

✎
Note   When connecting to a 1000BASE-T device, be sure to use a four twisted-pair, Category 5 cable.

Figure 2-41   Connecting to a 1000BASE-T GBIC Port

Step 2   Insert the other cable end in an RJ-45 connector on a target device.

Step 3   Observe the port status LED.

The LED turns green when the switch and the target device have an established link.

The LED turns amber while STP discovers the network topology and searches for loops. This process takes about 30 seconds, and then the LED turns green.

If the LED is off, the target device might not be turned on, there might be a cable problem, or there might be a problem with the adapter installed in the target device. See Chapter 3, "Troubleshooting," for solutions to cabling problems.

Step 4   Reconfigure and restart the switch or target device, if necessary.

Connecting to GigaStack GBIC Module Ports

After installing the GigaStack GBIC in the GBIC module slot, follow these steps:

Step 1   Insert the GigaStack cable connector in the GBIC (see Figure 2-42).

Figure 2-42   Connecting to a GigaStack GBIC Port

Step 2   Insert the other cable end in a port on a target device.

Step 3   Observe the port status LED.

The LED turns green when the switch and the target device have an established link.

The LED turns amber while STP discovers the network topology and searches for loops. This process takes about 30 seconds, and then the port LED turns green.

If the LED is off, the target device might not be turned on, there might be a cable problem, or there might be a problem with the adapter installed in the target device. See Chapter 3, "Troubleshooting," for solutions to cabling problems.

Step 4   Reconfigure and restart the switch or target device, if necessary.

Connecting to SFP Modules

This section describes how to connect to SFP modules. For instructions on how to connect to fiber-optic SFP modules, see the "Connecting to Fiber-Optic SFP Modules" section. For instructions on how to connect to copper 1000BASE-T SFP modules, see the "Connecting to 1000BASE-T SFP Modules" section.

For instructions about how to install or remove an SFP module, see the "Installing and Removing SFP Modules" section on page 2-23.

✎
Note   See the Catalyst 2950 LRE release notes for the list of supported SFP modules.

Connecting to Fiber-Optic SFP Modules

Follow these steps to connect a fiber-optic cable to an SFP module:

⚠
Caution   Do not remove the rubber plugs from the SFP module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP module ports and cables from contamination and ambient light.

Before connecting to the SFP module, be sure that you understand the port and cabling stipulations in the "Installation Guidelines" section on page 2-4 and in the "SFP Module Slots" section on page 1-11. See Appendix B, "Connectors and Cables," for information about the LC connector on fiber-optic SFP modules.

Step 1   Remove the rubber plugs from the module port and fiber-optic cable, and store them for future use.

Step 2   Insert one end of the fiber-optic cable into the SFP module port (see Figure 2-43).

Step 3   Insert the other cable end into a fiber-optic connector on a target device.

Step 4   Observe the port status LED.

The LED turns green when the switch and the target device have an established link.

The LED turns amber while the STP discovers the network topology and searches for loops. This process takes about 30 seconds, and then the port LED turns green.

If the LED is off, the target device might not be turned on, there might be a cable problem, or there might be problem with the adapter installed in the target device. See Chapter 3, "Troubleshooting," for solutions to cabling problems.

Figure 2-43   Connecting to a Fiber-Optic SFP Module Port
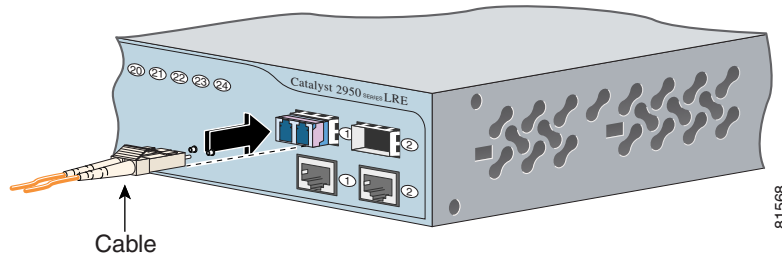
Cable

Step 5   If necessary, reconfigure and restart the switch or target device.

Connecting to 1000BASE-T SFP Modules

Follow these steps to connect a Category 5 cable to a 1000BASE-T SFP module:

Caution   To prevent ESD damage, follow your normal board and component handling procedures.

Step 1   When connecting to servers, workstations, and routers, insert a four twisted-pair, straight-through cable in the RJ-45 connector. When connecting to switches or repeaters, insert a four twisted-pair, crossover cable.

Note   When connecting to a 1000BASE-T device, be sure to use a four twisted-pair, Category 5 cable.

Figure 2-44   Connecting to a 1000BASE-T SFP Module
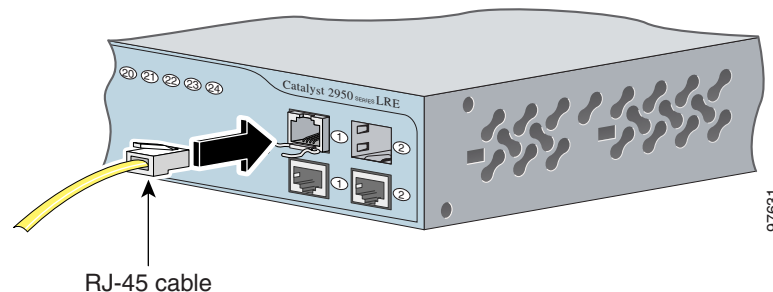
RJ-45 cable

Step 2   Insert the other cable end in an RJ-45 connector on a target device.

Step 3   Observe the port status LED.

The LED turns green when the switch and the target device have an established link.

The LED turns amber while the STP discovers the network topology and searches for loops. This process takes about 30 seconds, and then the port LED turns green.

If the LED is off, the target device might not be turned on, there might be a cable problem, or there might be problem with the adapter installed in the target device. See Chapter 3, "Troubleshooting," for solutions to cabling problems.

Step 4 If necessary, reconfigure and restart the switch or target device.

Where to Go Next

For information about starting up the switch, see the *Catalyst 2950 Switch Getting Started Guide*.

If the default configuration is satisfactory, the switch does not need further configuration. You can use any of these management options to change the default configuration:

- Start the device manager, which is in the switch memory, to manage individual and standalone switches. This is an easy-to-use web interface that offers quick configuration and monitoring. You can access the device manager from anywhere in your network through a web browser. For more information, see the device manager online help.

- Start the Network Assistant application, which is described in the *Getting Started with Cisco Network Assistant* guide. Through this GUI, you can configure and monitor a switch cluster or an individual switch.

- Use the CLI from the console to configure the switch as a member of a cluster or as an individual switch. See the *Catalyst 2950 and Catalyst 2955 Switch Software Configuration Guide* and the *Catalyst 2950 and Catalyst 2955 Switch Command Reference* on Cisco.com for more information.

  For setup instructions that use the CLI, go to Appendix D, "Configuring the Switch with the CLI-Based Setup Program."

- Start an SNMP application such as the CiscoView application.

For information about configuring the switch, see the switch software configuration guide.

3

Troubleshooting

The front-panel LEDs provide troubleshooting information about the switch. They show power-on self-test (POST) failures, port-connectivity problems, and overall switch performance. For a full description of the LEDs, see the "LEDs" section on page 1-13.

You can also get statistics from the device manager, the Network Assistant application, the CLI, the Cisco Intelligence Engine 2100 (IE2100) Series Configuration Registrar, or a SNMP workstation. See the switch software configuration guide, the switch command reference, or the documentation that came with your IE2100 or SNMP application for details.

This chapter provides these topics for troubleshooting problems:

- Understanding POST Results, page 3-1
- Diagnosing Problems, page 3-1

Understanding POST Results

When the switch powers on, it automatically begins POST, a series of tests that verifies that the switch functions properly. When the switch begins POST, the system LED is off. POST has completed successfully when the SYST and STAT LEDs are green.

> **Note** POST failures are usually fatal. Call Cisco Systems if your switch does not pass POST.

Diagnosing Problems

Common switch problems fall into these categories:

- Poor performance
- No connectivity
- Corrupted software

Table 3-1 describes how to detect and solve these problems.

Table 3-1   Common Problems and Solutions

Symptom	Possible Cause	Resolution
Poor performance or excessive errors.	Duplex autonegotiation mismatch.	See the switch software configuration guide for information about identifying autonegotiation mismatches.

	Cabling distance exceeded.
	
	• Port statistics show excessive FCS,[1] late-collision, or alignment errors.
	
	• For 10BASE-T, 100BASE-TX, and 1000BASE-T connections:
	  – The distance between the port and the attached device exceeds 328 feet (100 meters).
	  – If the switch is attached to a repeater, the total distance between the two end stations exceeds the cabling guidelines.
		• See the switch software configuration guide for information about displaying port statistics.
		
		• Reduce cable length to within the recommended distances.
		
		• Refer to your repeater documentation for cabling guidelines.

	• For GBIC module port connections: The distance between the GBIC module port and the attached device exceeds the GBIC cabling guidelines.	• Refer to your GBIC module documentation for cabling guidelines.
	• For SFP module port connections: The distance between the SFP module port and the attached device exceeds the SFP cabling guidelines.	• See Table 1-2 on page 1-12 for SFP cabling guidelines.
Poor performance or excessive errors (continued).	**Bad adapter in attached device.** • Excessive errors found in port statistics.	• Run adapter card diagnostic utility.
	STP[2] checking for possible loops.	Wait 30 seconds for port status LED to turn green.

Table 3-1   Common Problems and Solutions (continued)

Symptom	Possible Cause	Resolution
No connectivity.	**Incorrect or bad cable.** No link at both ends. • A crossover cable was used when a straight-through was required, or the reverse. • The cable is wired incorrectly. • STP checking for possible loops.	 • For the correct pinouts and the proper application of crossover vs. straight-through cables, see the "Cable and Adapter Specifications" section on page B-6. • Replace it with a tested good cable. • Wait 30 seconds for port status LED to turn green.
	Switch not recognizing a GBIC module.	Refer to your GBIC module documentation for more information.
	Switch not recognizing an SFP module.	Refer to your SFP module documentation for more information.
Unreadable characters on the management console.	Incorrect baud rate.	Reset the terminal-emulation software to 9600 baud.
System LED is amber, and all port LEDs are off.	Corrupted software.	Attach a monitor to the serial port to display the switch boot loader. For more information, see the switch software configuration guide.
System LED is amber.	• Internal fan fault detected. • Nonfatal or fatal POST error detected.	• Check if the fan has failed by using the **show env fan** privileged EXEC command. If the fan has failed, call Cisco Systems. • Use the **show post** privileged EXEC command to see which POST test failed.

Table 3-1   Common Problems and Solutions (continued)

Symptom	Possible Cause	Resolution
Switch placed in error-disabled state after CWDM[3] GBIC or SFP module is inserted.	Bad or non-Cisco-approved CWDM GBIC module or SFP module.	Remove the CWDM GBIC or SFP module from the switch, and replace it with a Cisco-approved module. Use the **errdisable recovery cause gbic-invalid** global configuration command to verify port status, and enter a time interval to recover from the error-disabled state. See the switch software configuration guide for information about the **errdisable recovery** command.
STAT LED on Catalyst 2950 LRE switch is not on.	Telephone cable is loose or is not connected properly.	Reseat telephone cable into the telephone wall jack and the Cisco LRE CPE[4].
	Telephone cable is defective.	Replace the telephone cable.
	Cable trunking defective.	Repair the cable trunking, or select an alternative pair of cables.
	Cisco LRE CPE is not communicating with Catalyst 2950 LRE switch, or Cisco LRE CPE might be attempting to exceed the rate or the reach selected by the switch.	• Reduce cable length to within the recommended distances. (See the "LRE Port" section on page 1-9 for LRE cabling guidelines.) • See the switch software configuration guide for information about verifying LRE port link status.
	Catalyst 2950 LRE switch does not support the Cisco LRE CPE.	See the compatibility matrix, Table 1-1 on page 1-3, for more information.

1. FCS = frame check sequence
2. STP = Spanning Tree Protocol
3. CWDM = Coarse Wave Division Multiplexer
4. CPE = customer premises equipment

Technical Specifications

Table A-1 through Table A-5 list the technical specifications for the Catalyst 2950 switches. Table A-6 lists the technical specifications for fiber-optic uplink ports.

Table A-7 lists the regulatory agency approvals for the switches other than the Catalyst 2950 Long-Reach Ethernet (LRE) switches. Table A-8 and Table A-9 list the regulatory agency approvals for the Catalyst 2950 LRE switches. Table A-10 lists the regulatory agency approval only for the Catalyst 2950G-24-EI-DC switch.

Table A-1 Technical Specifications for Catalyst 2950-12, 2950-24, 2950C-24, 2950SX-24, and 2950T-24 Switches

Environmental Ranges	
Operating temperature	32 to 113°F (0 to 45°C)
Storage temperature	–13 to 158°F (–25 to 70°C)
Operating humidity	10 to 85% (noncondensing)
Operating altitude	Up to 10,000 ft (3000 m)
Storage altitude	Up to 15,000 ft (4570 m)
Shock	84 in. per sec (2.13 m per sec)[1]
Power Requirements	
AC input voltage	100 to 127/200 to 240 VAC (autoranging) 50 to 60 Hz
DC input voltages for the Cisco RPS[2] 300 Redundant Power System	+12 V⎓@4.5 A
DC input voltages for the Cisco RPS 675	+12 V⎓@4.5 A
Power consumption	30 W (maximum)
	102 Btus per hour
Power rating	0.05 kVA
Physical Dimensions	
Weight	6.5 lb (3 kg)
Dimensions (H x W x D)	1.72 x 17.5 x 9.52 in. (4.36 x 44.45 x 24.18 cm)

1. This switch meets ASTM D3332.

2. RPS = redundant power system

Table A-2   Technical Specifications for Catalyst 2950G-12-EI, 2950G-24-EI, 2950G-48-EI, 2950SX-48-SI, and 2950T-48-SI Switches

	Catalyst 2950G-12-EI and 2950G-24-EI Switches	Catalyst 2950G-48-EI, 2950SX-48-SI, and 2950T-48-SI Switches
Environmental Ranges		
Operating temperature	32 to 113°F (0 to 45°C)	32 to 113°F (0 to 45°C)
Storage temperature	–13 to 158°F (–25 to 70°C)	–13 to 158°F (–25 to 70°C)
Operating humidity	10 to 85% (noncondensing)	10 to 85% (noncondensing)
Operating altitude	Up to 10,000 ft (3000 m)	Up to 10,000 ft (3000 m)
Storage altitude	Up to 15,000 ft (4570 m)	Up to 15,000 ft (4570 m)
Shock	84 in. per sec (2.13 m per sec)[1]	84 in. per sec (2.13 m per sec)
Power Requirements		
AC input voltage	100 to 127/200 to 240 VAC (autoranging) 50 to 60 Hz	100 to 127/200 to 240 VAC (autoranging) 50 to 60 Hz
DC input voltage for the Cisco RPS[2] 300	+12 V $=$ @4.5 A	+12 V $=$ @4.5 A
DC input voltage for the Cisco RPS 675	+12 V $=$ @4.5 A	+12 V $=$ @4.5 A
Power consumption	30 W (maximum) 102 Btus per hour	45 W (maximum) 154 Btus per hour
Power rating	0.05 kVA	0.075 kVA
Physical Dimensions		
Weight	6.5 lb (3 kg)	10.5 lb (4.8 kg)
Dimensions (H x W x D)	1.72 x 17.5 x 9.52 in. (4.36 x 44.45 x 24.18 cm)	1.72 x 17.5 x 13 in. (4.36 x 44.45 x 33.02 cm)

1. This switch meets ASTM D3332.

2. RPS = redundant power system

Table A-3   Technical Specifications for Catalyst 2950G-24-EI-DC Switch

Environmental Ranges	
Operating temperature	32 to 113°F (0 to 45°C)
Storage temperature	–13 to 158°F (–25 to 70°C)
Operating humidity	10 to 85% (noncondensing)
Operating altitude	Up to 10,000 ft (3000 m)
Storage altitude	Up to 15,000 ft (4570 m)

Table A-3   Technical Specifications for Catalyst 2950G-24-EI-DC Switch

Shock	84 in. per sec (2.13 m per sec)[1]
Power Requirements	
Power consumption	30W (102 Btus per hour)
Power rating	0.05 kVA
DC input voltage	–36 to –72 VDC
Wire gauge for power connection	18 AWG[2] (6 AWG for protective earth)
Branch circuit protection	5 A
Physical Dimensions	
Weight	6.5 lb (3 kg)
Dimensions (H x W x D)	1.72 x 17.5 x 9.52 in. (4.36 x 44.45 x 24.18 cm)

1. This switch meets ASTM D3332.

2. AWG = American Wire Gauge

Table A-4   Technical Specifications for Catalyst 2950ST-8 LRE and Catalyst-2950ST-24 LRE Switches

Environmental Ranges	
Operating temperature	32 to 113°F (0 to 45°C)
Storage temperature	–13 to 158°F (–25 to 70°C)
Operating humidity	10 to 85% (noncondensing)
Operating altitude	Up to 10,000 ft (3000 m)
Storage altitude	Up to 15,000 ft (4570 m)
Shock	84 in. per sec (2.13 m per sec)[1]
Power Requirements	
AC input voltage	100 to 127/200 to 240 VAC (autoranging) 50 to 60 Hz
DC input voltage for the Cisco RPS[2] 300	+12 V ⎓ @4 A
DC input voltage for the Cisco RPS 675	+12 V ⎓ @4 A
Power consumption	50W (maximum) 171 Btus per hour
Power rating	0.083 kVA
Branch circuit protection	5 A
Physical Dimensions	
Weight	8 lb (3.6 kg)
Dimensions (H x W x D)	1.73 x 17.5 x 9.96 in. (4.36 x 44.45 x 24.18 cm)

1. This switch meets ASTM D3332.

2. RPS = redundant power system

Table A-5   Technical Specifications for Catalyst-2950ST-24 997 LRE Switches

Environmental Ranges

Operating temperature	32 to 113°F (0 to 45°C)
Storage temperature	–13 to 158°F (–25 to 70°C)
Operating humidity	10 to 85% (noncondensing)
Operating altitude	Up to 10,000 ft (3000 m)
Storage altitude	Up to 15,000 ft (4570 m)
Shock	84 in. per sec (2.13 m per sec)[1]

Power Requirements

Power consumption	50W (maximum) 171 Btus per hour
Power rating	0.083 kVA
DC input voltage	–36 to –72 VDC
Wire gauge for power connection	18 AWG[2] (6 AWG for protective earth)
Branch circuit protection	5 A

Physical Dimensions

Weight	8 lb (3.6 kg)
Dimensions (H x W x D)	1.73 x 17.5 x 9.96 in. (4.36 x 44.45 x 24.18 cm)

1. This switch meets ASTM D3332.

2. AWG = American Wire Gauge

Table A-6   Fiber-Optic Port Specifications for Catalyst 2950C-24, Catalyst 2950SX-24, and Catalyst 2950 LRE Switches

Fiber-Port Power Levels	Catalyst 2950C-24	Catalyst 2950SX-24	Catalyst 2950ST-8 LRE, 2950ST-24 LRE, and 2950ST-24 LRE 997
Optical transmitter wavelength	1300 nm[1]	850 nm	The transmitter wavelengths, receiver sensitivities, and transmitter power levels are SFP[2]-module dependent. For this information, see the technical specifications that came with your SFP module.
Optical receiver sensitivity for 50/125-micron cabling	−33.5 to −11.8 dBm[3]	−13.5 dBm	
Optical receiver sensitivity for 62.5/125-micron cabling	−33.5 to −11.8 dBm	−12.5 dBm	
Optical transmitter power for 50/125-micron cabling	−23.5 to −14 dBm	−9.5 to −4 dBm	
Optical transmitter power for 62.5/125-micron cabling	−20 to −14 dBm	−9.5 to −4 dBm	

1.   nm = nanometers

2.   SFP = small form-factor pluggable

3.   dBm = decibel milliwatt

Table A-7   Catalyst 2950 Switch Agency Approvals

Safety	EMC
UL/CSA 60950	FCC Part 15 Class A
IEC 60950/EN 60950	EN 55022: 1998 (CISPR22) Class A
AS/NZS 3260, TS001	EN 55024: 1998 (CISPR24)
CE	VCCI Class A
	AS/NZS 3548 Class A
	CE
	CNS 13438 Class A
	MIC

Table A-8   Catalyst 2950ST-8 LRE and 2950ST-24 LRE Switch Agency Approvals

Safety	EMC
UL/CSA 60950, 3rd edition	USA CFR47, FCC, Part 15, Class A
IEC 60950 with Amendments A1 through A4 and A11	ICES-003, Class A
AS/NZS 3260 with Amendments A1 through A4	EN55022/CISPR22, Class A, 1998

Table A-8   Catalyst 2950ST-8 LRE and 2950ST-24 LRE Switch Agency Approvals (continued)

Safety	EMC
TUV-GS to EN60950 with Amendments A1 through A4 and A11	EN 55024: ITE Immunity Standard. (CE Mark), 1998
CE	EN61000-4-2/IEC1000-4-2: Immunity to ESD
	EN61000-4-3/IEC1000-4-3: Immunity to Radio Frequency Electromagnetic Fields
	EN61000-4-4/IEC1000-4-4: Immunity to Electrical Fast Transients
	EN61000-4-5/IEC1000-4-5: Immunity to Power Line Transients (Surges)
	EN61000-4-6/IEC1000-4-6: Immunity to Radio Frequency Induced Conducted Disturbances
	EN61000-4-11/IEC1000-4-11: Immunity to Voltage Dips, Voltage Variations, and Short Voltage Interruptions
	AS/NZS 3548, Class A
	BSMI, Class A
	VCCI, Class A
	MIC Mark

Table A-9   Catalyst 2950ST-24 LRE 997 Switch Agency Approvals

Safety	EMC
UL/CSA 60950, 3rd edition	USA CFR47, FCC, Part 15, Class A
IEC 60950 with Amendments A1 through A4 and A11	ICES-003, Class A
AS/NZS 3260 with Amendments A1 through A4	EN55022/CISPR22, Class A, 1998
TUV-GS to EN60950 with Amendments A1 through A4 and A11	EN 55024: ITE Immunity Standard. (CE Mark), 1998
CE	EN61000-4-2/IEC1000-4-2: Immunity to ESD
	EN61000-4-3/IEC1000-4-3: Immunity to Radio Frequency Electromagnetic Fields
	EN61000-4-4/IEC1000-4-4: Immunity to Electrical Fast Transients
	EN61000-4-5/IEC1000-4-5: Immunity to Power Line Transients (Surges)
	EN61000-4-6/IEC1000-4-6: Immunity to Radio Frequency Induced Conducted Disturbances
	EN61000-4-11/IEC1000-4-11: Immunity to Voltage Dips, Voltage Variations, and Short Voltage Interruptions

Table A-10   Catalyst 2950G-24-EI-DC Switch Agency Approvals

NEBS
Bellcore GR-1089-CORE
Bellcore GR-63-CORE
Bellcore SR-3580 Level 3

B

Connectors and Cables

This appendix describes the connectors, cables, and adapters that you use to connect the switch to other devices.

Connector Specifications

These sections describe the connectors used with the Catalyst 2950 switches and contains this information:

10/100 Ports

The 10/100 Ethernet ports use standard RJ-45 connectors and Ethernet pinouts with internal crossovers, as shown by an **X** in the port name. These ports have the transmit (TD) and receive (RD) signals internally crossed so that a twisted-pair straight-through cable and adapter can be attached to the port. Figure B-1 shows the pinout.

When connecting 10/100 ports to other devices, such as servers, workstations, and routers, you can use a two or four twisted-pair, straight-through cable wired for 10BASE-T and 100BASE-TX. Figure B-10 shows the two twisted-pair, straight-through cable schematics. Figure B-12 shows the four twisted-pair, straight-through cable schematics.

When connecting the ports to other devices, such as switches or repeaters, you can use a two or four twisted-pair, crossover cable. Figure B-11 shows the two twisted-pair, crossover cable schematics. Figure B-13 shows the four twisted-pair, crossover cable schematics.

You can use Category 3, 4, or 5 cabling when connecting to 10BASE-T devices. You must use Category 5 cabling when connecting to 100BASE-TX devices.

✎
Note   Use a straight-through cable to connect two ports only when one port is designated with an **X**. Use a crossover cable to connect two ports when both ports are designated with an **X** or when both ports do not have an **X**.

Figure B-1   10/100 RJ-45 Pinouts

Pin	Label	1 2 3 4 5 6 7 8
1	RD+	
2	RD-	
3	TD+	
4	NC	
5	NC	
6	TD-	
7	NC	
8	NC	

10/100/1000 Ports

The 10/100/1000 Ethernet ports on Catalyst 2950T-24, Catalyst 2950T-48-SI, and Catalyst 2950 Long-Reach Ethernet (LRE) switches use standard RJ-45 connectors. Figure B-2 shows the pinout.

✎
Note   On the Catalyst 2950 LRE switches, the four input uplink ports are bundled as two logical ports, each consisting of a copper 10/100/1000 port and a fiber-optic small form-factor pluggable (SFP) module slot, respectively.

Within each logical port, you can use only the copper or the fiber-optic port at one time. If the Catalyst 2950 LRE switch senses more than two connections for both logical ports, the switch chooses the fiber-optic connections over the copper connections in default operation.

See the "SFP Module Slots" section on page 1-11 for more information on LRE uplink logical ports.

Connecting to 10BASE-T and 100BASE-TX Devices

When connecting the ports to 10BASE-T and 100BASE-TX devices, such as servers, workstations, and routers, you can use a two or four twisted-pair, straight-through cable wired for 10BASE-T and100BASE-TX. Figure B-10 shows the two twisted-pair, straight-through cable schematics. Figure B-12 shows the four twisted-pair, straight-through cable schematics.

When connecting the ports to 10BASE-T- and 100BASE-TX devices, such as switches or repeaters, you can use a two or four twisted-pair, crossover cable. Figure B-11 shows the two twisted-pair, crossover cable schematics. Figure B-13 shows the four twisted-pair, crossover cable schematics.

You can use Category 3, 4, or 5 cabling when connecting to 10BASE-T devices. You must use Category 5 cabling when connecting to 100BASE-TX devices.

Connecting to 1000BASE-T Devices

When connecting the ports to 1000BASE-T devices, such as servers, workstations, and routers, you must use a four twisted-pair, Category 5, straight-through cable wired for 10BASE-T, 100BASE-TX, and 1000BASE-T. Figure B-14 shows the straight-through cable schematics.

When connecting the ports to other devices, such as switches or repeaters, you must use a four twisted-pair, Category 5, crossover cable. Figure B-15 shows the crossover cable schematics.

Note Be sure to use a four twisted-pair, Category 5 cable when connecting to a 1000BASE-T device.

Note Use a straight-through cable to connect two ports only when one port is designated with an **X**. Use a crossover cable to connect two ports when both ports are designated with an **X** or when both ports do not have an **X**.

Figure B-2   RJ-45 Pinouts for 10/100/1000 and 1000BASE-T GBIC Module Ports

Pin	Label
1	TP0+
2	TP0-
3	TP1+
4	TP2+
5	TP2-
6	TP1-
7	TP3+
8	TP3-

1 2 3 4 5 6 7 8

34751

LRE Port

The LRE port uses a single 50-pin RJ-21 connector, as shown in Figure B-3. Each LRE port uses two pins. Because the Catalyst 2950ST-24 LRE and Catalyst 2950ST-24 LRE 997 switches use 48 pins, pin 25 on the top row and pin 50 on the bottom row are not used

The Catalyst 2950ST-8 LRE switch uses 16 pins. Pins 9 through 25 on the top row and pins 34 through 50 on the bottom row are not used.

Figure B-3   RJ-21 Connector

25   9   1

50   34   26
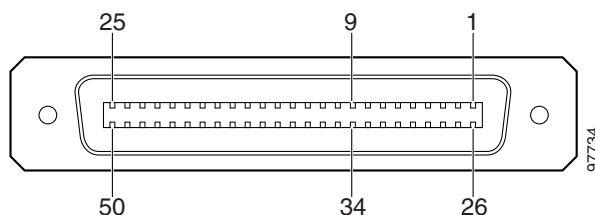
97734

100BASE-FX and 1000BASE-SX Ports

The 100BASE-FX and 1000BASE-SX ports use MT-RJ connectors, shown in Figure B-4. These ports use 50/125- or 62.5/125-micron multimode fiber-optic cabling.

You can connect a 100BASE-FX or 1000BASE-SX port to an SC or ST port on a target device by using one of the MT-RJ fiber-optic patch cables listed in Table 2-1 on page 2-29. Use the Cisco part numbers in Table 2-1 to order the patch cables that you need.

Figure B-4   MT-RJ Connector
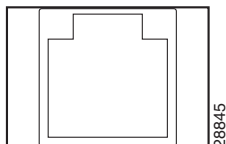
1000BASE-X GBIC Module Ports

1000BASE-X Gigabit Interface Converter (GBIC) module ports use duplex SC connectors, as shown in Figure B-5.

Figure B-5   1000BASE-X SC Connector

Tx   Rx
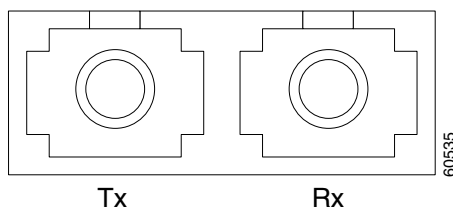
1000BASE-T GBIC Module Ports

The 1000BASE-T GBIC module port uses one RJ-45 connector, as shown in Figure B-2.

GigaStack GBIC Module Ports

The GigaStack GBIC module ports use proprietary connectors, as shown in Figure B-6. The GigaStack GBIC cables are proprietary, high-data-rate cables with enhanced signal integrity and EMI protection.

⚠

Caution   Do not use standard IEEE 1394 cables with the GigaStack GBIC.

Figure B-6   GigaStack Connector
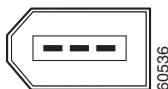
SFP Module Ports

The Catalyst 2950 LRE switch uses SFP modules for fiber-optic and copper uplink ports. See the Catalyst 2950 LRE switch release notes for a list of supported SFP modules. See Figure B-7 and Figure B-8.

Figure B-7   Fiber-Optic SFP Module LC Connector
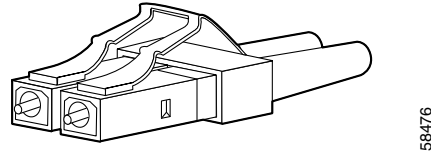
58476

⚠ **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

Figure B-8   1000BASE-T SFP Module RJ-45 Connector

Pin	Label
1	TP0+
2	TP0-
3	TP1+
4	TP2+
5	TP2-
6	TP1-
7	TP3+
8	TP3-

1 2 3 4 5 6 7 8

60915

Console Port

The console port uses an 8-pin RJ-45 connector. You can connect a switch to a PC through the console port and the supplied RJ-45-to-DB-9 adapter cable. If you want to connect a switch to a terminal, you need to provide an RJ-45-to-DB-25 female DTE adapter. You can order a kit (part number ACS-DSBUASYN=) with that adapter from Cisco. For console-port and adapter-pinout information, see Table B-3 and Table B-4.

Identifying a Crossover Cable

You can identify a crossover cable by comparing the two modular cable ends. Hold the cable ends side-by-side, with the tab at the back. The wire connected to the pin on the outside of the left plug should be the same color as the wire connected to the pin on the outside of the right plug. (See Figure B-9.)

Figure B-9   Identifying a Crossover Cable

Pin 1 on one connector and
pin 8 on the other connector
should be the same color.

Pin 1 →   ← Pin 8

H10632
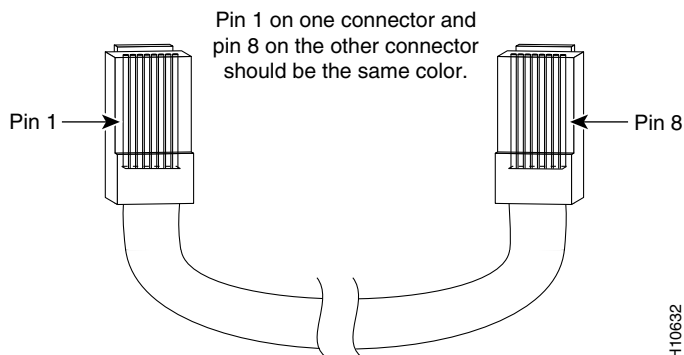
Cable and Adapter Specifications

These sections describe the cables and adapters used with Catalyst 2950 switches.

Two Twisted-Pair Cable Pinouts

Figure B-10 and Figure B-11 show the schematics of two twisted-pair cables for 10/100 ports.

Figure B-10   Two Twisted-Pair Straight-Through Cable Schematic for 10/100 Ports

Switch   Router or PC

3 TD+ ——————→ 3 RD+
6 TD– ——————→ 6 RD–

1 RD+ ←—————— 1 TD+
2 RD– ←—————— 2 TD–

H5578
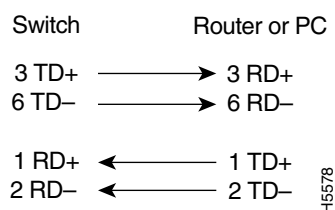
Figure B-11   Two Twisted-Pair Crossover Cable Schematic for 10/100 Ports

Switch   Switch

3 TD+ ———   ——— 3 TD+
6 TD– ——— X ——— 6 TD–

1 RD+ ←———   ———→ 1 RD+
2 RD– ←———   ———→ 2 RD–

H5579
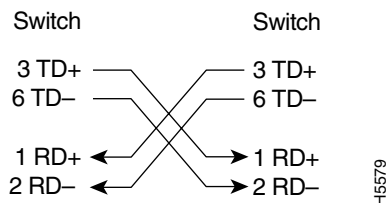
Four Twisted-Pair Cable Pinouts for 10/100 Ports

Figure B-12 and Figure B-13 show the schematics of four twisted-pair cables for 10/100 ports.

Figure B-12 Four Twisted-Pair Straight-Through Cable Schematic for 10/100 Ports

```
   Switch                Router or PC

1  RD+    ◄──────────    1  TD+
2  RD-    ◄──────────    2  TD-
3  TD+    ──────────►    3  RD+
6  TD-    ──────────►    6  RD-


4  NC                    4  NC
5  NC                    5  NC
7  NC                    7  NC          65271
8  NC                    8  NC
```
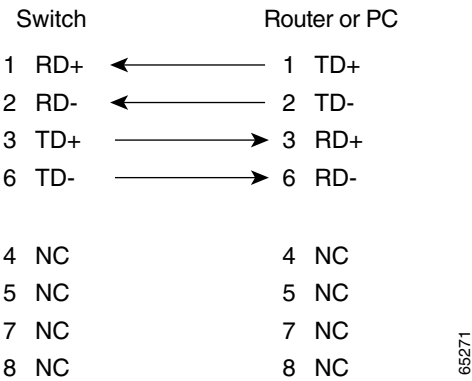
Figure B-13 Four Twisted-Pair Crossover Cable Schematic for 10/100 Ports

```
   Switch                Switch

1  RD+    ◄───╲  ╱───►    1  RD+
2  RD-    ◄───╲╳╱───►    2  RD-
3  TD+    ───╱╳╲───    3  TD+
6  TD-    ───╱  ╲───    6  TD-


4  NC                    4  NC
5  NC                    5  NC
7  NC                    7  NC          65273
8  NC                    8  NC
```
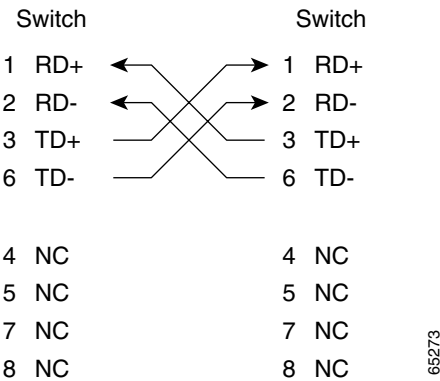
Four Twisted-Pair Cable Pinouts for 1000BASE-T Ports

Figure B-14 and Figure B-15 show the schematics of four twisted-pair cables for 10/100/1000 ports on Catalyst 2950T-24 switches, Catalyst 2950 LRE switches, and 1000BASE-T GBIC module ports.

Figure B-14   Four Twisted-Pair Straight-Through Cable Schematic for 10/100/1000 and 1000BASE-T GBIC Module Ports
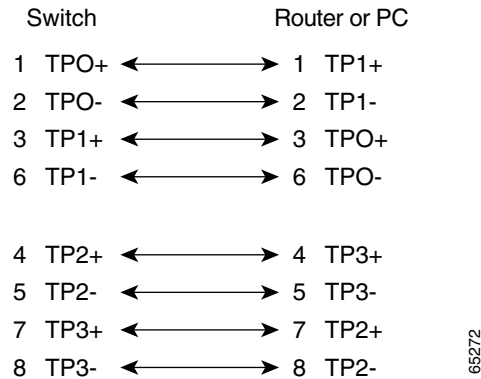
Figure B-15   Four Twisted-Pair Crossover Cable Schematics for 10/100/1000 and 1000BASE-T GBIC Module Ports
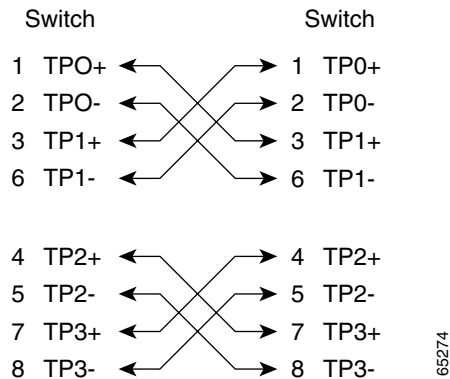
RJ-21 Cable Pinouts

Table B-1 lists the RJ-21 cable pinouts on the Catalyst 2950ST-24 LRE and Catalyst 2950ST-24 LRE 997 switches.

Table B-1   Catalyst 2950ST-24 LRE and Catalyst 2950ST-24 LRE 997 Switch RJ-21 Cable Pinouts

Function	Pin	Pin	Function
Port 1 Tip	1	26	Port 1 Ring
Port 2 Tip	2	27	Port 2 Ring
Port 3 Tip	3	28	Port 3 Ring
Port 4 Tip	4	29	Port 4 Ring

Table B-1   Catalyst 2950ST-24 LRE and Catalyst 2950ST-24 LRE 997 Switch RJ-21 Cable Pinouts

Function	Pin	Pin	Function
Port 5 Tip	5	30	Port 5 Ring
Port 6 Tip	6	31	Port 6 Ring
Port 7 Tip	7	32	Port 7 Ring
Port 8 Tip	8	33	Port 8 Ring
Port 9 Tip	9	34	Port 9 Ring
Port 10 Tip	10	35	Port 10 Ring
Port 11 Tip	11	36	Port 11 Ring
Port 12 Tip	12	37	Port 12 Ring
Port 13 Tip	13	38	Port 13 Ring
Port 14 Tip	14	39	Port 14 Ring
Port 15 Tip	15	40	Port 15 Ring
Port 16 Tip	16	41	Port 16 Ring
Port 17 Tip	17	42	Port 17 Ring
Port 18 Tip	18	43	Port 18 Ring
Port 19 Tip	19	44	Port 19 Ring
Port 20 Tip	20	45	Port 20 Ring
Port 21 Tip	21	46	Port 21 Ring
Port 22 Tip	22	47	Port 22 Ring
Port 23 Tip	23	48	Port 23 Ring
Port 24 Tip	24	49	Port 24 Ring
No connect	25	50	No connect

Table B-2 lists the RJ-21 cable pinouts on the Catalyst 2950ST-8 LRE switches.

Table B-2   Catalyst 2950ST-8 LRE Switch RJ-21 Cable Pinouts

Function	Pin	Pin	Function
Port 1 Tip	1	26	Port 1 Ring
Port 2 Tip	2	27	Port 2 Ring
Port 3 Tip	3	28	Port 3 Ring
Port 4 Tip	4	29	Port 4 Ring
Port 5 Tip	5	30	Port 5 Ring
Port 6 Tip	6	31	Port 6 Ring
Port 7 Tip	7	32	Port 7 Ring
Port 8 Tip	8	33	Port 8 Ring
No connect	9	34	No connect
No connect	10	35	No connect

Table B-2   Catalyst 2950ST-8 LRE Switch RJ-21 Cable Pinouts (continued)

Function	Pin	Pin	Function
No connect	11	36	No connect
No connect	12	37	No connect
No connect	13	38	No connect
No connect	14	39	No connect
No connect	15	40	No connect
No connect	16	41	No connect
No connect	17	42	No connect
No connect	18	43	No connect
No connect	19	44	No connect
No connect	20	45	No connect
No connect	21	46	No connect
No connect	22	47	No connect
No connect	23	48	No connect
No connect	24	49	No connect
No connect	25	50	No connect

Adapter Pinouts

Table B-3 lists the pinouts for the console port, the RJ-45-to-DB-9 adapter cable, and the console device.

Table B-3   Console Port Signaling and RJ-45-to-DB-9 Adapter Cabling

Console Port (DTE)	RJ-45-to-DB-9 Adapter Cable		Console Device
Signal	RJ-45 Pin	DB-9 Pin	Signal
RTS	1	8	CTS
Not connected	2	6	DSR
TxD	3	2	RxD
GND	4	5	GND
GND	5	5	GND
RxD	6	3	TxD
Not connected	7	4	DTR
CTS	8	7	RTS

Table B-4 lists the pinouts for the console port, RJ-45-to-DB-25 female DTE adapter, and the console device.

Note   The RJ-45-to-DB-25 female DTE adapter is not supplied with the switch. You can order a kit (part number ACS-DSBUASYN=) with that adapter from Cisco.

Table B-4   Console Port Signaling and Cabling Using a DB-25 Adapter

Console Port (DTE)	RJ-45-to-DB-9 Adapter Cable		RJ-45-to-DB-25 Terminal Adapter	Console Device
Signal	RJ-45 Pin	DB-9 Pin	DB-25 Pin	Signal
RTS	1	8	5	CTS
Not connected	2	6	6	DSR
TxD	3	2	3	RxD
GND	4	5	7	GND
GND	5	5	7	GND
RxD	6	3	2	TxD
Not connected	7	4	20	DTR
CTS	8	7	4	RTS

Connecting to DC Power

To connect the Catalyst 2950G-24-EI-DC or Catalyst 2950ST-24 LRE 997 switch to a direct current (DC)-input power source, follow these steps:

Warning **The Catalyst 2950G-24-EI-DC contains no field-replaceable units (FRUs). Do not open the chassis or attempt to remove or replace any components. For information about obtaining service for this unit, contact your reseller or Cisco sales representative.** Statement 121C

Warning **The Catalyst 2950ST-24 LRE 997 contains no field-replaceable units (FRUs). Do not open the chassis or attempt to remove or replace any components. For information about obtaining service for this unit, contact your reseller or Cisco sales representative.** Statement 121D

Warning **This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.** Statement 1017

Warning **Ethernet cables must be shielded when used in a central office environment.** Statement 171

Caution Installation of the equipment must comply with local and national electrical codes.

Preparing for Installation

Locate the DC terminal block plug, the ground lug, and the two number-10-32 screws in the DC-switch kit.

Obtain these necessary tools and equipment:

- Ratcheting torque screwdriver with a Phillips head that exerts up to 15 pound-force inches (lbf-in.) of pressure

- Panduit crimping tool with optional controlled cycle mechanism (model CT-700, CT-720, CT-920, CT-920CH, CT-930, or CT-940CH)

- 6-gauge copper ground wire (insulated or noninsulated)

- Four leads of 18-gauge copper wire

- Wire-stripping tools for stripping 6- and 18-gauge wires

Grounding the Switch

⚠️
Warning   **This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use.** Statement 39

⚠️
Warning   **When installing the unit, always make the ground connection first and disconnect it last.** Statement 42

⚠️
Caution   To make sure that the equipment is reliably connected to earth ground, follow the grounding procedure instructions, and use a UL-listed lug suitable for number-6 AWG wire and two number-10-32 ground-lug screws.

To ground the switch to earth ground, follow these steps. Make sure to follow any grounding requirements at your site.

Step 1   Locate the ground lug and the two number-10-32 screws. The ground lug and screws are on the rear panel of the Catalyst 2950G-24-EI-DC switch or on the front panel of the Catalyst 2950ST-24 LRE 997 switch.

Use a standard Phillips screwdriver or a ratcheting torque screwdriver with a Phillips head. Set the screws and the ground lug aside.

Step 2   If your ground wire is insulated, use a wire stripping tool to strip the 6-gauge ground wire to 0.5 inch (12.7 millimeter [mm]) ± 0.02 inch (0.5 mm) as shown in Figure C-1.

Figure C-1   Stripping the Ground Wire
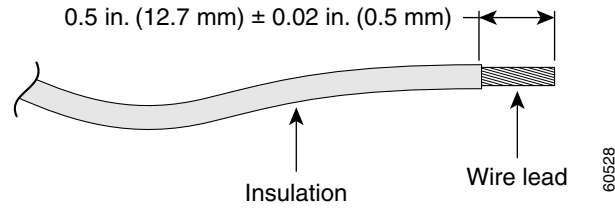
0.5 in. (12.7 mm) ± 0.02 in. (0.5 mm)

Insulation

Wire lead

60528

Step 3   Slide the open end of the ground lug over the exposed area of the 6-gauge wire.

Step 4   Using a Panduit crimping tool, crimp the ground lug to the 6-gauge wire.

Figure C-2   Crimping the Ground Lug

60529
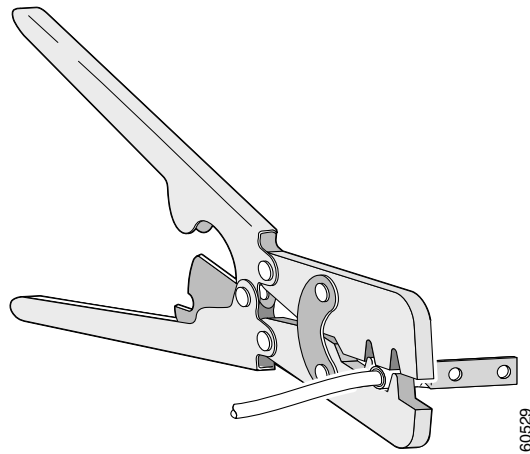
Step 5   Use the two number-10-32 screws to attach the ground lug and wire assembly to the rear panel of the Catalyst 2950G-24-EI-DC switch or to the front panel of the Catalyst 2950ST-24 LRE 997 switch.

Step 6   Using a ratcheting torque screwdriver, torque each ground-lug screw to 15 lbf-in. (240 ounce-force inches [ozf-in.]). Figure C-3 shows how to torque the ground screws on a Catalyst 2950G-24-EI-DC switch.

Figure C-3   Torquing Ground-Lug Screws

Torque to 15 lbf-in.
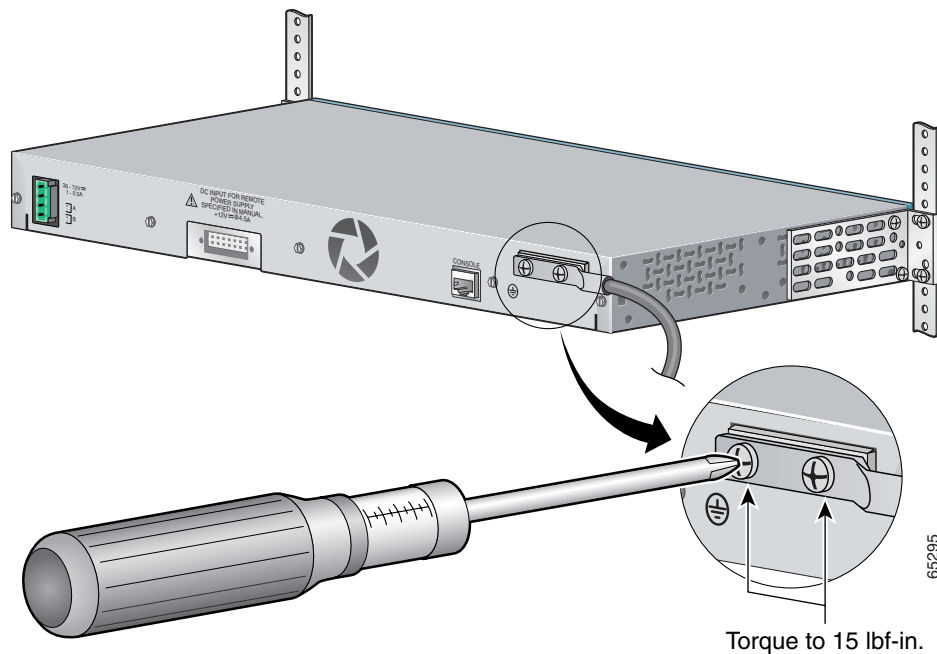
Wiring the DC-Input Power Source

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

Warning   **Before connecting or disconnecting ground or power wires to the chassis, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position. Use a voltmeter to test for 0 (zero) voltage at the power terminals on the chassis.** Statement 196

Caution   You must connect the Catalyst 2950G-24-EI-DC or Catalyst 2950ST-24 LRE 997 switch only to a DC-input power source that has an input supply voltage from –36 to –72 VDC. If the supply voltage is not in this range, the switch might not operate properly or might be damaged.

Caution   The switch must be installed with 5-A-branch-circuit protection.

Note   This installation must comply with all applicable codes.

To wire the switch to a DC-input power source, follow these steps:

Step 1   Locate the terminal block plug (see Figure C-4).

Figure C-4   Terminal Block Plug
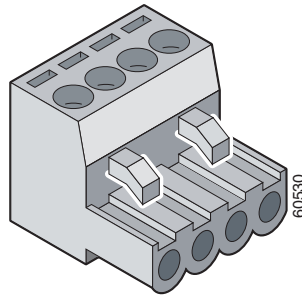
Step 2   Identify the positive and negative feed positions for the terminal block connection. The wiring sequence is positive to positive and negative to negative for both the A and the B feed wires.

The rear panel of the Catalyst 2950G-24-EI-DC switch or the front panel of the Catalyst 2950ST-24 LRE 997 switch identifies the positive and negative positions for both the A and B feed wires. Figure C-5 shows the positions on the Catalyst 2950G-24-EI-DC switch.

Figure C-5   Positive and Negative Positions
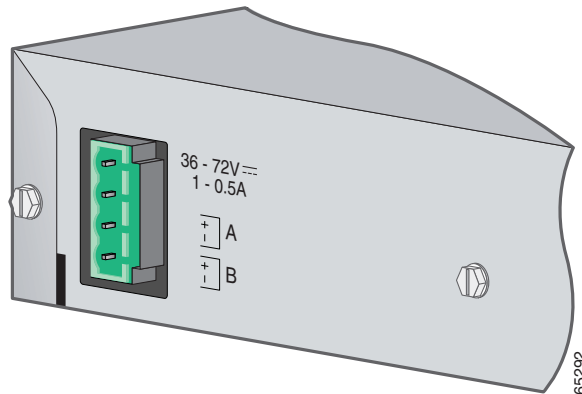
Step 3   Using an 18-gauge wire-stripping tool, strip each of the four wires coming from the DC-input power source to 0.27 inch (6.6 mm) ± 0.02 inch (0.5 mm). Do not strip more than 0.29 inch (7.4 mm) of insulation from the wire. Stripping more than the recommended amount of wire can leave exposed wire from the terminal block plug after installation.

Figure C-6   Stripping the DC-Input Power Source Wire

0.25 in. (6.3 mm) ± 0.02 in. (0.5 mm)
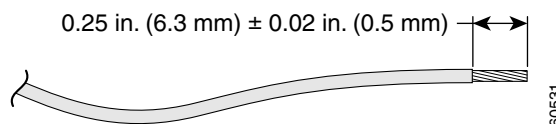
Step 4 Insert the exposed wire of one of the four DC-input power source wires into the terminal block plug, as shown in Figure C-7. Make sure that you cannot see any wire lead. Only wire *with insulation* should extend from the terminal block.

Warning **An exposed wire lead from a DC-input power source can conduct harmful levels of electricity. Be sure that no exposed portion of the DC-input power source wire extends from the terminal block plug.** Statement 122

Figure C-7   Inserting Wires in the Terminal Block Plug
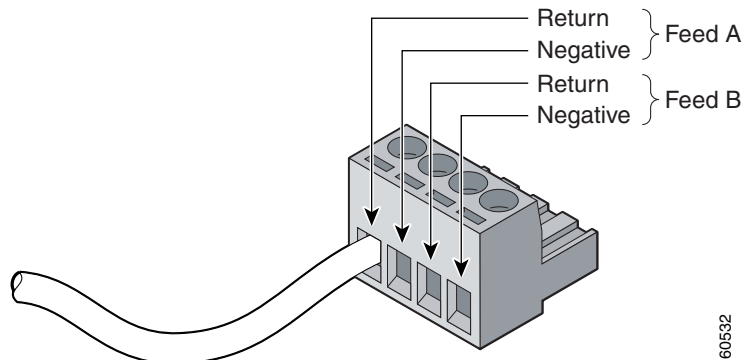
Step 5 Use a ratcheting torque screwdriver to torque the terminal block captive screw (above the installed wire lead) to 4.5 lbf-in. (72 ozf-in.). (See Figure C-8.)

Caution Do not overtorque the terminal-block captive screws. The recommended maximum torque is 4.5 lbf-in.

Figure C-8   Torquing the Terminal-Block Captive Screws
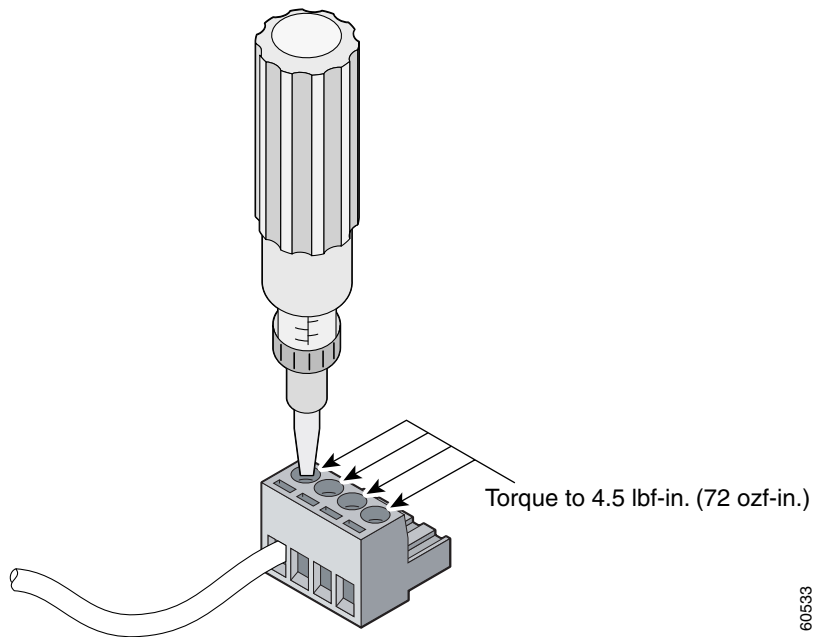
Step 6   Repeat Steps 4 and 5 for the remaining three DC-input power source wires. Figure C-9 shows the completed wiring of a terminal block plug.

Figure C-9   Completed Wiring of Terminal Block Plug
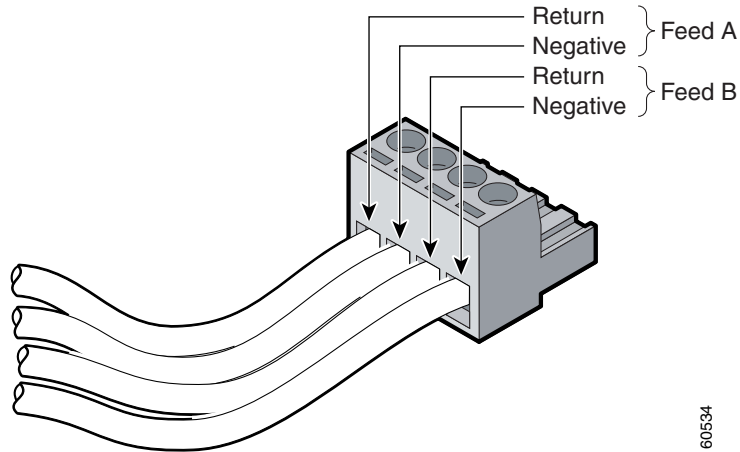
Step 7   Insert the terminal block plug in the terminal block header on the rear panel of the Catalyst 2950G-24-EI-DC switch or on the front panel of the Catalyst 2950ST-24 LRE 997 switch. Figure C-10 shows how to insert the terminal block on a Catalyst 2950G-24-EI-DC switch.

⚠

Caution   Secure the wires coming in from the terminal block so that they cannot be disturbed by casual contact. For example, use tie wraps to secure the wires to the rack.

Figure C-10   Inserting the Terminal Block in the Block Header
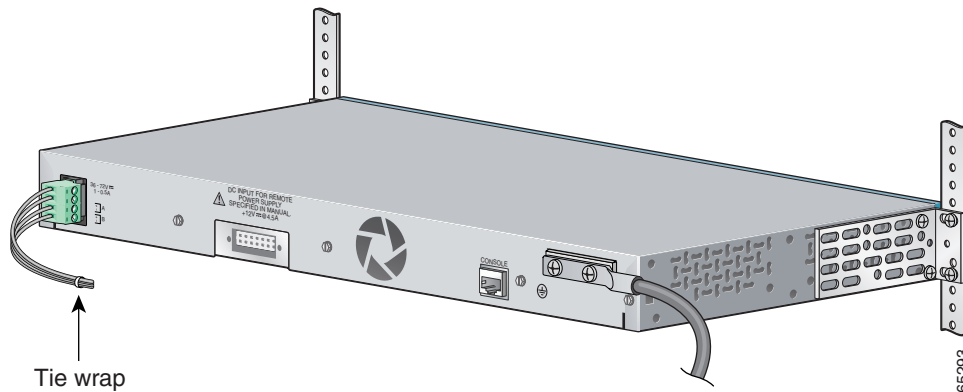
Step 8   Remove the tape from the circuit-breaker switch handle, and move the circuit-breaker handle to the on position.

Configuring the Switch with the CLI-Based Setup Program

This appendix provides a command-line interface (CLI)-based setup procedure for a standalone switch. For product overview information, see Chapter 1, "Overview." Before connecting the switch to a power source, review the safety warnings in Chapter 2, "Installation." For installation procedures on rack-mounting your switch, connecting to the Gigabit Ethernet Interface Converter (GBIC) modules, or connecting to the small form-factor pluggable (SFP) modules, see Chapter 2, "Installation."

These steps describe how to do a simple installation:

1. Accessing the CLI, page D-1
2. Taking Out What You Need, page D-3
3. Connecting to the Console Port, page D-3
4. Starting the Terminal-Emulation Software, page D-4
5. Connecting to a Power Source, page D-5
6. Entering the Initial Configuration Information, page D-5

Accessing the CLI

For an unconfigured switch, you can access the CLI through Express Setup or through the console port.

Accessing the CLI Through Express Setup

Express Setup is supported on switches running Cisco IOS Release 12.1(14)EA1 or later. If you are installing an unconfigured switch, see the Cisco IOS release label on the rear panel of the switch to determine the release.

✎
Note   For switches running releases earlier than Cisco IOS Release 12.1(14)EA1, go to the "Taking Out What You Need" section on page D-3.

You can access the CLI on an unconfigured switch by placing the switch in Express Setup mode and then by connecting a switch Ethernet port to the Ethernet port of your PC or workstation. To put the switch into Express Setup mode, follow the steps described in the getting started guide for powering on the switch and using Express Setup.

After the switch is in Express Setup mode, open a Telnet session to the switch by entering the IP address *10.0.0.1*. Enter the **setup** user EXEC command. See these sections in this chapter to then configure the switch by using the CLI:

After you have entered the configuration information for the switch, use the **write memory** privileged EXEC command to save it to Flash memory.

> ✎
> **Note**   While in Express Setup mode, the IP address 10.0.0.1 is active until you enter the **write memory** command. You lose the Telnet connection after entering the **write memory** command.

For more information about using the CLI, see the switch command reference for this release.

Accessing the CLI Through the Console Port

You can access the CLI on a configured or unconfigured switch by connecting the console port of the switch to the serial port on your PC or workstation and accessing the switch through a Telnet session. To access the switch through the console port, follow these steps:

Taking Out What You Need

Remove the items shown in Figure D-1 from the shipping container:

Figure D-1   Catalyst 2950 Switch, Adapter Cable, and AC Power Cord
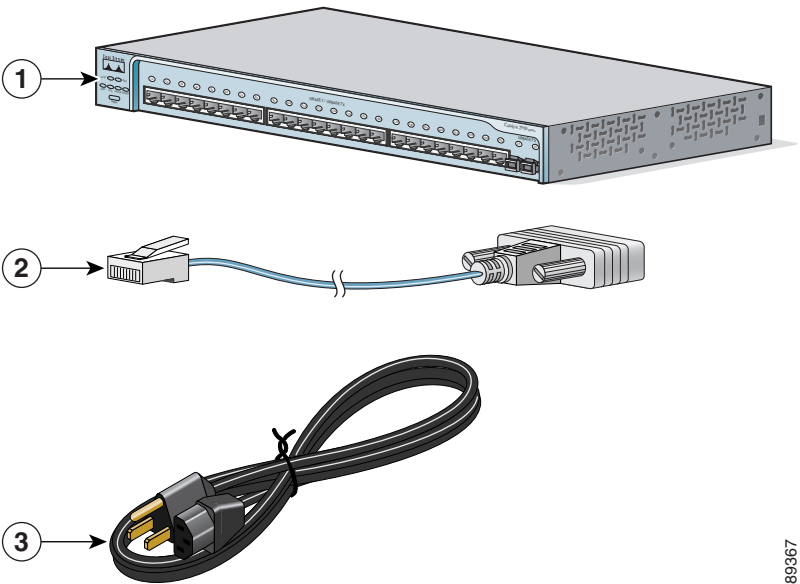
1	Catalyst 2950 switch	**3**	AC power cord
2	RJ-45-to-DB-9 adapter cable		

✎

Note   You need to provide the Category 5 straight-through cables to connect the switch ports to other Ethernet devices.

Connecting to the Console Port

You can use the console port to perform the initial configuration. To connect the switch console port to a PC, use the supplied RJ-45-to-DB-9 adapter cable.

Follow these steps to connect the PC or terminal to the switch:

Step 1   Using the supplied RJ-45-to-DB-9 adapter cable, insert the RJ-45 connector into the console port on the rear of a switch, as shown in Figure D-2.

Step 2   Attach the DB-9 female DTE of the adapter cable to a PC serial port, or attach an appropriate adapter to the terminal.

Figure D-2   Connecting a Switch to a PC
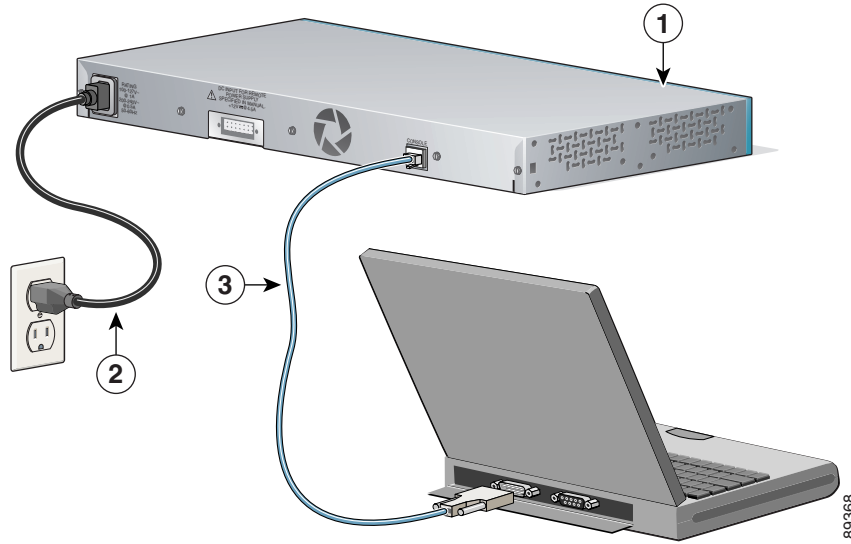
1	Catalyst 2950 switch	**3**	RJ-45-to-DB-9 adapter cable
2	Power cord		

Starting the Terminal-Emulation Software

Before you power on the switch, start the terminal-emulation session so that you can see the output display from the power-on self-test (POST).

The terminal-emulation software—frequently a PC application such as Hyperterminal or ProcommPlus—makes communication between the switch and your PC or terminal possible.

Follow these steps to start a terminal-emulation session:

Step 1 Start the terminal-emulation program if you are using a PC or terminal.

Step 2 Configure the baud rate and character format of the PC or terminal to match these console port default characteristics:

- 9600 baud
- 8 data bits
- 1 stop bit
- No parity
- None (flow control)

Connecting to a Power Source

This section has instructions for connecting the switch to AC power. For instructions about connecting the Catalyst 2950G-24-EI-DC or Catalyst 2950ST-24 LRE 997 switch to DC power, see Appendix C, "Connecting to DC Power."

For a switch other than a Catalyst 2950G-24-EI-DC or a Catalyst 2950ST-24 LRE 997 switch, follow these steps to connect to an AC power source:

Step 1   Connect one end of the supplied AC power cord to the power connector on the switch rear panel.

> ✎
> **Note**   For an LRE switch, connect one end of the supplied AC power cord to the power connector on the switch front panel.

Figure D-2 shows how to connect the AC power cord to the connector on the switch rear panel.

Step 2   Connect the other end of the power cable to a grounded AC outlet.

> ✎
> **Note**   If you are connecting the switch to a Cisco redundant power system (RPS), see the documentation that shipped with your RPS.

When the switch powers on, it begins the POST, a series of tests that runs automatically to ensure that the switch functions properly. If POST fails, see Chapter 3, "Troubleshooting," to determine a course of action.

Entering the Initial Configuration Information

To set up the switch, you need to complete the setup program, which runs automatically after the switch is powered on. You must assign an IP address and other configuration information necessary for the switch to communicate with the local routers and the Internet. This information is also required if you plan to use the Network Assistant to configure and manage the switch.

IP Settings

You will need this information from your network administrator before you complete the setup program:

- Switch IP address
- Subnet mask (IP netmask)
- Default gateway (router)
- Enable secret password
- Enable password
- Telnet password

Completing the Setup Program

Follow these steps to complete the setup program and to create an initial configuration for the switch:

Step 1   Enter **Yes** at these two prompts.

```
Would you like to enter the initial configuration dialog? [yes/no]: yes

At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.

Basic management setup configures only enough connectivity
for management of the system, extended setup will ask you
to configure each interface on the system.

Would you like to enter basic management setup? [yes/no]: yes
```

Step 2   Enter a host name for the switch, and press **Return**.

On a command switch, the host name is limited to 28 characters; on a member switch to 31 characters. Do not use *-n*, where n is a number, as the last character in a host name for any switch.

```
Enter host name [Switch]: host_name
```

Step 3   Enter an enable secret password, and press **Return**.

The password can be from 1 to 25 alphanumeric characters, can start with a number, is case sensitive, allows spaces, but ignores leading spaces. The secret password is encrypted, and the enable password is in plain text.

```
Enter enable secret: secret_password
```

Step 4   Enter an enable password, and press **Return**.

```
Enter enable password: enable_password
```

Step 5   Enter a virtual terminal (Telnet) password, and press **Return**.

The password can be from 1 to 25 alphanumeric characters, is case sensitive, allows spaces, but ignores leading spaces.

```
Enter virtual terminal password: terminal-password
```

Step 6   (Optional) Configure Simple Network Management Protocol (SNMP) by responding to the prompts. You can also configure SNMP later through the command-line interface (CLI), the device manager, or the Network Assistant application. To configure SNMP later, enter **no**.

```
Configure SNMP Network Management? [no]: no
```

Step 7   Enter the interface name (physical interface or virtual local-area network [VLAN] name) of the interface that connects to the management network, and press **Return**. For this release, always use vlan1 as that interface.

```
Enter interface name used to connect to the
management network from the above interface summary: vlan1
```

Step 8   Configure the interface by entering the switch IP address and subnet mask and pressing **Return**. The IP address and subnet masks shown below are examples.

```
Configuring interface vlan1:
Configure IP on this interface? [yes]: yes
IP address for this interface: 10.4.120.106
Subnet mask for this interface [255.0.0.0]: 255.0.0.0
```

Step 9   Enter **Y** to configure the switch as the cluster command switch. Enter **N** to configure it as a member switch or as a standalone switch.

If you enter **N**, the switch appears as a candidate switch in the Network Assistant GUI. You can configure the switch as a command switch later through the CLI, the device manager, or the Network Assistant application. To configure it later, enter **no**.

```
Would you like to enable as a cluster command switch? [yes/no]: no
```

You have now completed the initial configuration of the switch, and the switch displays that configuration. This is an example of the output that appears:

```
The following configuration command script was created:
hostname host_name
enable secret 5 $1$Max7$Qgr9eXBhtcBJw3KK7bc850
enable password my
line vty 0 15
password my_password
snmp-server community public
!
no ip routing
!
interface Vlan1
no shutdown
ip address 172.20.139.145 255.255.255.224
!
interface Vlan2
shutdown
no ip address
!
interface FastEthernet0/1
!
interface FastEthernet0/2
!
...<output abbreviated>
!!!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
end
```

Step 10   These choices appear:

```
[0] Go to the IOS command prompt without saving this config.

[1] Return back to the setup without saving this config.

[2] Save this configuration to nvram and exit.
```

```
If you want to save the configuration and use it the next time the switch reboots, save it
in nonvolatile RAM (NVRAM) by selecting option 2.

Enter your selection [2]:2
```

Make your selection, and press **Return**.

After you complete the setup program, the switch can run the default configuration that you created. If you want to change this configuration or want to perform other management tasks, use one of these tools:

- CLI
- Device manager from your browser (for one switch)
- Network Assistant (for one or more switches)

To use the CLI, enter commands at the *Switch>* prompt through the console port by using a terminal-emulation program or through the network by using Telnet. For configuration information, see the switch software configuration guide or the switch command reference.

To use the Network Assistant, see the *Getting Started with Cisco Network Assistant* guide.

D

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