CISCO SYSTEMS

Catalyst 4224 Access Gateway Switch Hardware Installation Guide

C O N T E N T S

Catalyst 4224 Access Gateway Switch Hardware Installation Guide

INDEX

Preface

This preface describes who should read the *Catalyst 4224 Access Gateway Switch Hardware Installation Guide*, how it is organized, and its document conventions.

Audience

This publication is intended for experienced network administrators who are responsible for installing the Catalyst 4224 Access Gateway Switch (Catalyst 4224).

Organization

This publication is organized as follows:

Chapter	Title	Description
Chapter 1	Product Overview	Provides a system overview of a Catalyst 4224, including the supported interface cards.
Chapter 2	Preparing for Installation	Describes how to prepare your site for installation of the Catalyst 4224.
Chapter 3	Installing the Catalyst 4224 Access Gateway Switch	Describes how to install the Catalyst 4224.

Chapter	Title	Description
Chapter 4	Installing the Catalyst 4224 Access Gateway Switch Interface Cards	Describes how to install and connect the interface cards on the Catalyst 4224.
Chapter 5	Troubleshooting	Describes how the LEDs on the front panel provide troubleshooting information.
Appendix A	Technical Specifications	Describes the technical specifications for the Catalyst 4224.
Appendix B	Connector and Cable Specifications	Describes the ports, cables and adapters that you use to connect the switch to other devices.
Appendix C	Identifying Hardware Problems with the ROM Monitor	Describes how to use the ROM monitor bootstrap program.
Appendix D	Repacking the Catalyst 4224 Access Gateway Switch	Describes the repacking and shipping instructions.

Conventions

This publication uses the following conventions:

Convention	Description
boldface font	Commands and keywords are in **boldface**.
italic font	Arguments for which you supply values are in *italics*.
[ ]	Elements in square brackets are optional.
{ x	y	z }	Alternative keywords are grouped in braces and separated by vertical bars.
[x	y	z]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.

Convention	Description
screen font	Terminal sessions and information the system displays are in screen font.
boldface screen font	Information you must enter is in **boldface screen** font.
italic screen font	Arguments for which you supply values are in *italic screen* font.
⟶	This pointer highlights an important line of text in an example.
^	The symbol ^ represents the key labeled Control—for example, the key combination ^D in a screen display means hold down the Control key while you press the D key.
< >	Nonprinting characters, such as passwords are in angle brackets.

Notes use the following conventions:

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the publication.

Cautions use the following conventions:

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

Warnings use the following conventions:

Warning   **This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. (To see translations of the warnings that appear in this publication, refer to the appendix, "Translated Safety Warnings.")**

Waarschuwing   **Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. (Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het aanhangsel "Translated Safety Warnings" (Vertalingen van veiligheidsvoorschriften) raadplegen.)**

Varoitus   **Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. (Tässä julkaisussa esiintyvien varoitusten käännökset löydät liitteestä "Translated Safety Warnings" (käännetyt turvallisuutta koskevat varoitukset).)**

Attention   **Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures. Avant d'accéder à cet équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures courantes de prévention des accidents. Pour obtenir les traductions des mises en garde figurant dans cette publication, veuillez consulter l'annexe intitulée « Translated Safety Warnings » (Traduction des avis de sécurité).**

Warnung Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. (Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Anhang mit dem Titel "Translated Safety Warnings" (Übersetzung der Warnhinweise).)

Avvertenza Questo simbolo di avvertenza indica un pericolo. Si è in una situazione che può causare infortuni. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nell'appendice, "Translated Safety Warnings" (Traduzione delle avvertenze di sicurezza).

Advarsel Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. (Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i vedlegget "Translated Safety Warnings" [Oversatte sikkerhetsadvarsler].)

Aviso Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos fisicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. (Para ver as traduções dos avisos que constam desta publicação, consulte o apêndice "Translated Safety Warnings" - "Traduções dos Avisos de Segurança").

Advertencia Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. (Para ver traducciones de las advertencias que aparecen en esta publicación, consultar el apéndice titulado "Translated Safety Warnings.")

Varning!   **Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. (Se förklaringar av de varningar som förekommer i denna publikation i appendix "Translated Safety Warnings" [Översatta säkerhetsvarningar].)**

Related Documentation

The following publications are available for the Catalyst 4000 family switches:

- *Catalyst 4224 Access Gateway Switch Software Configuration Guide*
- *Regulatory Compliance and Safety Information for Catalyst 4200 Series Access Gateway Switch*
- *Catalyst 4003 and 4006 Installation Guide*
- *Catalyst 4000 Access Gateway Module Installation and Configuration Note*
- *Catalyst 4000 Encryption Service Adapter Installation and Configuration Note*
- *Release Notes for Catalyst 4000 Family Software Release 5.x*
- *Catalyst 3620 Installation and Configuration Guide*
- *Catalyst 3200 Installation and Configuration Guide*
- *Quick Start Guide Cisco 2600 Series Cabling and Setup*
- *Cisco 2600 Series Power Supply Configuration Guide*
- *Quick Software Configuration—Catalyst 4000 Family, Catalyst 29266 Series, Catalyst 29486, and Catalyst 2908G Switches*
- *System Message Guide—Catalyst 6000 Family, Catalyst 5000 Family, Catalyst 4000 Family, Catalyst 2948G, and Catalyst 2980G Switches*
- *Command Reference—Catalyst 4000 Family, Catalyst 2980G, and Catalyst 2948G*
- *Cisco IOS Desktop Switching Command Reference*

- *Software Configuration Guide—Catalyst 4000 Family, Catalyst 2948G, Catalyst 2980G*

- Cisco IOS Configuration Guides and Command References—Use these publications to help you configure the Cisco IOS software.

- For information about MIBs, refer to:

  http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

Obtaining Documentation

The following sections provide sources for obtaining documentation from Cisco Systems.

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- http://www.cisco.com

- http://www-china.cisco.com

- http://www-europe.cisco.com

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

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

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170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com as a starting point for all technical assistance. Customers and partners can obtain documentation, troubleshooting tips, and sample configurations from online tools. For Cisco.com registered users, additional troubleshooting tools are available from the TAC website.

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information and resources at anytime, from anywhere in the world. This highly integrated Internet application is a powerful, easy-to-use tool for doing business with Cisco.

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Customers and partners can self-register on Cisco.com to obtain additional personalized information and services. Registered users can order products, check on the status of an order, access technical support, and view benefits specific to their relationships with Cisco.

To access Cisco.com, go to the following website:

http://www.cisco.com

Technical Assistance Center

The Cisco TAC website is available to all customers who need technical assistance with a Cisco product or technology that is under warranty or covered by a maintenance contract.

Contacting TAC by Using the Cisco TAC Website

If you have a priority level 3 (P3) or priority level 4 (P4) problem, contact TAC by going to the TAC website:

http://www.cisco.com/tac

P3 and P4 level problems are defined as follows:

- P3—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.

- P4—You need information or assistance on Cisco product capabilities, product installation, or basic product configuration.

In each of the above cases, use the Cisco TAC website to quickly find answers to your questions.

To register for Cisco.com, go to the following website:

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

If you cannot resolve your technical issue by using the TAC online resources, Cisco.com registered users can open a case online by using the TAC Case Open tool at the following website:

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

Contacting TAC by Telephone

If you have a priority level 1(P1) or priority level 2 (P2) problem, contact TAC by telephone and immediately open a case. To obtain a directory of toll-free numbers for your country, go to the following website:

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

P1 and P2 level problems are defined as follows:

- P1—Your production network is down, causing a critical impact to business operations if service is not restored quickly. No workaround is available.

- P2—Your production network is severely degraded, affecting significant aspects of your business operations. No workaround is available.

Product Overview

This section describes the Catalyst 4224 Access Gateway Switch and contains the following topics:

Note Throughout this publication, the term *Catalyst 4224* is used to refer to the Catalyst 4224 Access Gateway Switch.

Switch Features

The Catalyst 4224 is a compact, five-slot voice and data integrated switch/router intended for use by enterprise branch offices with as many as 24 users (see Figure 1-1).

Figure 1-1   Catalyst 4224 Access Gateway Switch
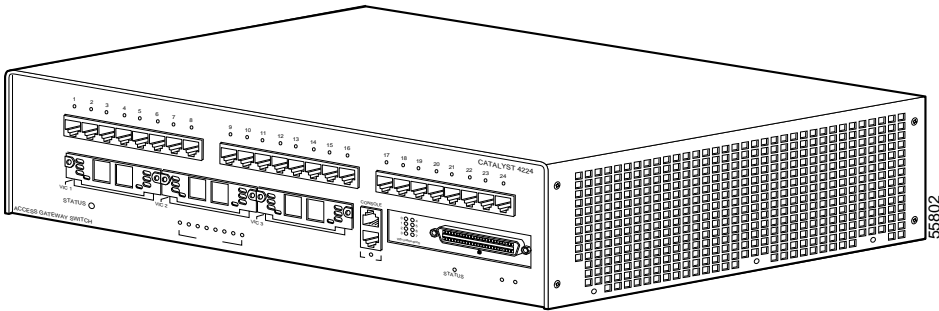
The Catalyst 4224 can interface with networking equipment using Ethernet (10BaseT) and Fast Ethernet (100BaseT) interfaces.

The Catalyst 4224 has five slots. Slots 1 and 2 are reserved for the voice interface cards (VICs) and wide area network interface cards (WICs). Slot 3 is reserved for a VIC. Slot 4 is reserved for the eight-Port RJ21 FXS module. Slot 5 consists of 24 10BaseT and 100BaseTX autosensing ports with Quality of Service (QoS) support. For more information, see the "Slots" section on page 1-7.

Table 1-1 describes the Catalyst 4224 features.

Table 1-1   Catalyst 4224 Access Gateway Switch Features

Feature	Description
Ethernet speeds	• Ethernet (10BaseT) interface to workstations and repeaters • Fast Ethernet (100BaseT) interface to workstations, servers, switches, and routers Note Auto-negotiation of link speed on each 10/100 port allows migration to 100BaseT from a 10BaseT installed base.
Standard management and support	• Layer 2 forwarding and filtering at full wire speed on each port • 16,000 MAC[1] addresses per system • Up to 1,024 VLANs with IEEE 802.1Q VLAN tagging on all ports and support for VTP[2]

Table 1-1   Catalyst 4224 Access Gateway Switch Features (continued)

Feature	Description

Software management	• CLI[3] and SNMP[4] interfaces consistent with the Catalyst 4000 and 5000 family switches
	
	• Development of new features compatible with the Catalyst 5000 family switches
	
	• Out-of-band management through the RJ-45 10/100 Ethernet port
	
	• 10/100 out-of-band management and in-band management through any switch port with SNMP, Telnet client, and TFTP
	
	Note The Catalyst 4224 has a 10/100BaseT management port.
	
	• RMON[5] with RMON 1
	
	• Standard Layer 2 elements:
	   – 802.1D Spanning Tree
	   – CDP[6]
	   – VTP version 2 with pruning extensions
	   – CGMP[7] client

Embedded management	• Full SNMP implementation, including entity-MIB, all relevant standard MIBs, and all relevant Cisco MIBs • The first four RMON groups (Ethernet statistics, Alarms, Events, and History) supported on a per-port basis without an optional RMON processing module • Redirection of traffic from any port to a *sniff* port (any switching port can be designated as a *sniff* port) • Performance management information

Table 1-1   Catalyst 4224 Access Gateway Switch Features (continued)

Feature	Description
Encryption support	• 3DES encryption/decryption on two duplex E1 links with 64-byte packets. This translates to a data rate of 8 mbps and 15 kbps, respectively. • Simultaneously support 10 tunnels and 60 security associations • 4 IKE[8] SA setups per second
Power supplies	• Two 240W, 12V output power supplies with AC power factor correction

1. MAC = Media Access Control

2. VTP = VLAN Trunk Protocol

3. CLI = command-line interface

4. SNMP = Simple Network Management Protocol

5. RMON = Remote Monitoring

6. CDP = Cisco Discovery Protocol

7. CGMP = Cisco Group Management Protocol

8. IKE = Internet Key Exchange

Switch Components

This section describes the Catalyst 4224 components:

Front Panel

Figure 1-2 shows the front panel of the Catalyst 4224.

Figure 1-2   Catalyst 4224 Access Gateway Switch Front Panel
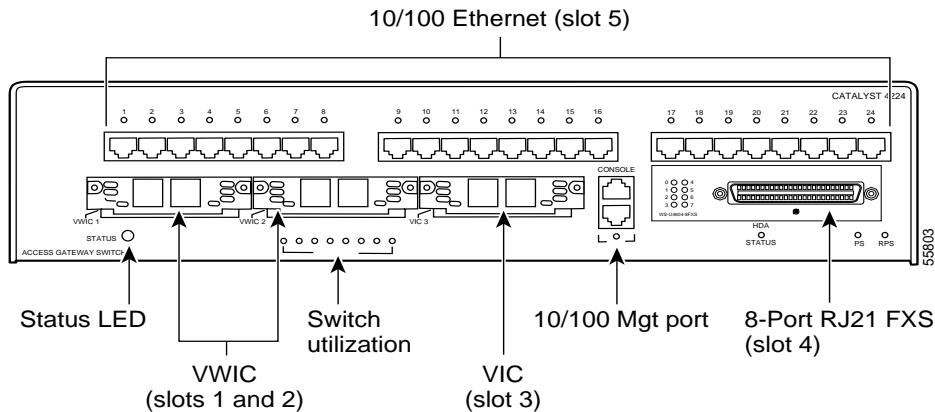
Management Ports

The Catalyst 4224 has two types of management ports: console serial and 10/100BaseT management.

Console Serial Port

An RJ-45 console serial port allows you to perform switch-management functions using a terminal.

For a description of the console port pinouts, see Appendix A, "Technical Specifications."

10/100BaseT Port

An RJ-45 802.3-compliant port allows you to perform TCP/IP switch-management functions (Telnet, SNMP, and FTP), configure IP addresses with BOOTP, and download software images.

Note The 10/100BaseT port is used for network management only. You cannot use this port for switching. No connection exists between this port and the 10/100BaseT switching ports.

For a description of the management port pinouts, see Appendix A, "Technical Specifications."

Slots

The Catalyst 4224 has the following slots:

- Two 68-pin Voice/WAN Interface Card (VWIC) slots identified as slots 1 and 2:
  - As a VIC slot, supports both data time-division multiplexing (TDM) and signaling highways
  - As a VIC slot, supports Foreign eXchange Station (FXS), Foreign eXchange Office (FXO), Ear and Mouth (E&M), single/dual ISDN Basic Rate Interface (BRI) S/T, and single/dual Cisco T1/E1 VICs
  - As a WIC slot, supports single and dual channel WAN cards using serial communication controller (SCC) NMSI ports or Cisco dual T1 WIC using time-division multiplexing (TDM) ports
  - As a WIC slot, supports the drop-and-insert function only as provided by a Cisco dual T1/E1 WIC
  - Hot-insertion support depends on the particular module
- One 68-pin VIC slot identified as slot 3, which support the following:
  - Both data and signaling highway VIC TDM ports for dual T1/E1 VICs
  - FXS, FXO, single/dual ISDN BRI S/T, and single/dual Cisco T1/E1 VICs
  - Drop-and-insert function using the TDM switch on the motherboard and on the Cisco T1/E1 VIC

- – Hot insertion capability available for applicable VIC/WICs

    - – WIC modules that use IOM2 interfaces

- One high-density analog flexslot identified as slot 4, which supports the following:

    - – eight-port RJ21 FXS module

    - – Codec and two Subscriber's Line Interface Circuits (SLIC)s for every two ports

    - – Adaptive echo cancellation (EC)

    - – Full world homo-location by software configuration only

    - – Self-generated sinusoidal ringing (balanced)

    - – EC freeze on fax and modem calls

    - – Dual tone multifrequency (DTMF) relay

- 24 10/100 port-powered Ethernet switch identified as slot 5

Front Panel LEDs

The LEDs on the front panel of the Catalyst 4224 are described in Table 1-2.

Table 1-2   Catalyst 4224 Switch Front Panel LEDs

LED	Color	Description
STATUS		Indicates the results of a series of self-test diagnostics.
	Green	All tests pass.
	Red	A test other than an individual port test fails.
	Orange	System boot or diagnostic tests in progress.
	Off	Switch is disabled.
Link Status		Indicates the link status of an Ethernet port.
	Green	Port is operational.
	Orange	Port is disabled by user.
	Flashing orange	Power-on self-test indicates faulty port.
	Off	No signal detected or link configuration failure.

Table 1-2   Catalyst 4224 Switch Front Panel LEDs (continued)

LED	Color	Description
1% to 100% Utilization		Displays the switch utilization on all 24 10/100 ports.
10/100 Mgt		Indicates the link status of the port.
	Green	Port is operational.
	Off	Port is not operational.
eight-port FXS Module		Indicates port link status.
	Green	Phone is off-hook and port is operational.
	Orange	Phone is on-hook and port is disabled.
	Off	Port is not active or link is not connected.
HDA status		Indicates detection status of the eight-port FXS module.
	Green	FXS module has been detected and initialized.
	Orange	FXS failed or is absent.
PS and RPS		Indicates power supply operation or failure.
	Green	Power supply is operational.
	Orange	Power supply has failed or is in Standby mode.

Fan Assembly

The system fan assembly provides cooling air for the internal chassis components. The fans exhaust warm air from one end and draw in cool air at the other end.

Note   For complete environmental specifications, including airflow requirements, see Appendix A, "Technical Specifications."

Figure 1-3 shows the direction of airflow through the Catalyst 4224.

Figure 1-3   Catalyst 4224 Access Gateway Switch Airflow
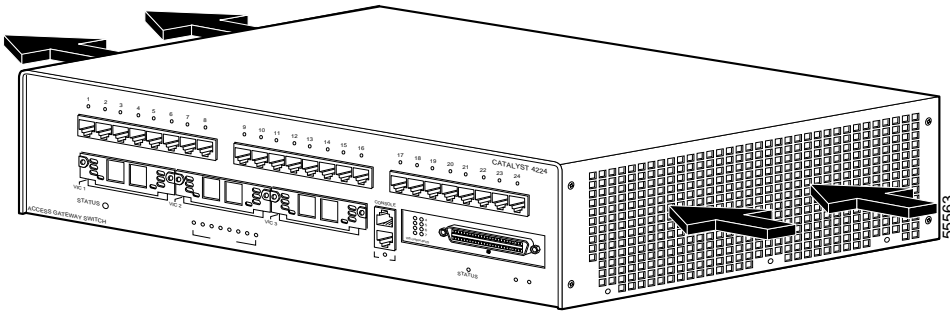
If an individual fan fails, the other fans continue to run. Sensors monitor the internal air temperatures. If the air temperature exceeds a tolerable threshold, the environmental monitor displays warning messages.

Power Supplies

The Catalyst 4224 supplies 240W, 12V output power with AC power factor correction. When power is removed from the power supply on a Catalyst 4224, the Cisco Redundant Power System 300 (RPS 300) is triggered to produce full power (see Figure 1-4). The RPS 300 provides internal power supply redundancy for up to six networking devices and features an immediate failover capability. When the RPS 300 is combined with the Catalyst 4224 and a uninterruptible power supply (UPS), the branch office receives highly available voice, video, and data services.

Figure 1-4   Catalyst 4224 Access Gateway Switch and the RPS 300
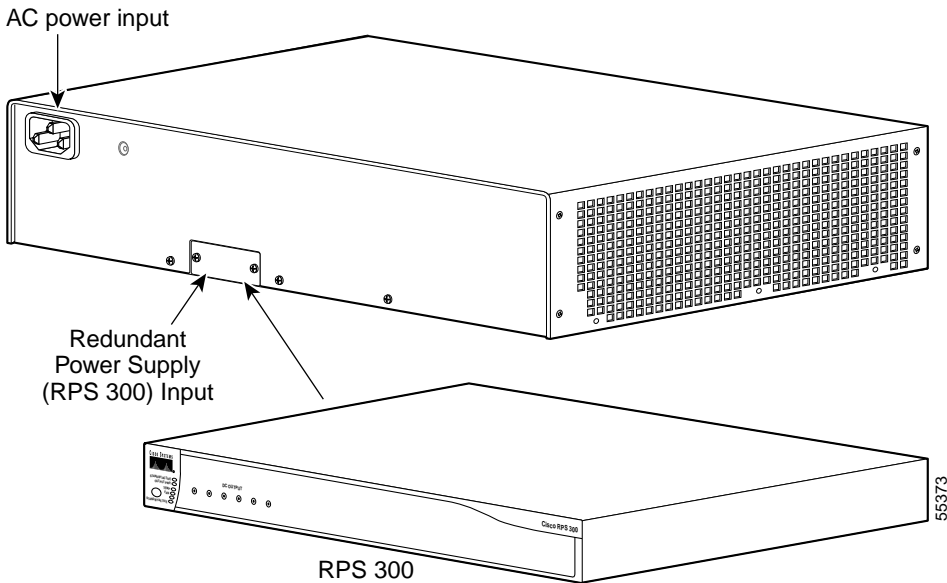
> **Note**   For complete power specifications for the Catalyst 4224, see Appendix A, "Technical Specifications."

Environmental Monitoring Feature

The environmental monitoring feature maintains the normal system operation by correcting adverse environmental conditions before the switch ceases to operate.

Every 30 seconds, a background switch process monitors the status of the RPS 300 and the temperature sensor. If one of the following situations is detected, the STATUS LED turns red:

- Internal supply fails
- Temperature exceeds 65°C
- POST failure

Based on the situation detected, the RPS LED is set as follows:

- Green, which indicates that the RPS is up and running (the default).

- Yellow, which indicates one of the following:

  - The RPS is in Fault mode or the operators have set the RPS system to standby mode, in which case an RPS DC failure message will be broadcast.

  - The AC power supply of the Catalyst 4224 has failed and the RPS backup is running, in which case an AC failure message will be broadcast.

- Off, which indicates that the RPS is disconnected or shut down.

Inline Power

Instead of requiring wall power at every desktop, terminal devices such as IP phones use power supplied by the Catalyst 4224. Each of the 24 ports on the Catalyst 4224 provide 6.3 watts of -48V power to the IP phones over standard 5 UTP cable up to 100 meters. By default, the ports are set to AUTO to power up an IP phone discovered via CDP on that port.

Supported Interface Cards

This section outlines the interface cards supported by the Catalyst 4224:

- WAN Interface Cards, page 1-12

- Voice Interface Cards, page 1-16

- T1/E1 Multiflex Voice/WAN Interface Cards, page 1-19

WAN Interface Cards

The Catalyst 4224 allows you to perform LAN switching and IP WAN routing by using WICs. A one-port 56/64-kbps data service unit/channel service unit (DSU/CSU) card provides service at 56- and 64-kbps; a two-port asynchronous/synchronous serial card provides service to dedicated 64 kbps

lines; a one- or two-port serial card provides service at speeds up to 115.2 kbps; and a two-port ISDN card provides connection to an ISDN WAN through an external NT1 device.

For details on these WAN interface cards, see the following sections:

- One-Port 56/64-kbps DSU/CSU Card, page 1-13
- One-Port T1/FT1 DSU/CSU Card, page 1-13
- Two-Port Asynchronous/Synchronous Serial Card, page 1-14
- One-Port and Two-Port Serial Cards, page 1-15

One-Port 56/64-kbps DSU/CSU Card

The one-port 56/64-kbps Data Service Unit/Channel Service Unit (DSU/CSU) card (see Figure 1-5) includes an integrated DSU/CSU. You can configure this card to provide circuit-switched, dedicated, or leased-line service at 56 kbps. This card also supports 64-kbps dedicated lines.

The Catalyst 4224 supports the WIC-1DSU-56K DSU/CSU card.

Figure 1-5   WIC-1DSU-56K—Front Panel View
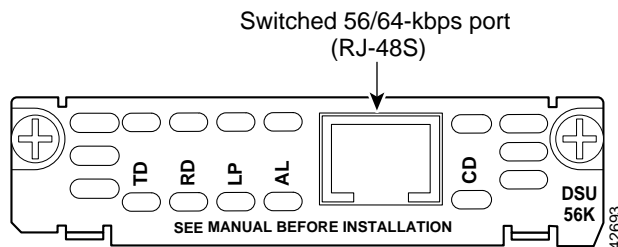
One-Port T1/FT1 DSU/CSU Card

The one-port T1/fractionalized T1 (FT1) WAN interface card (see Figure 1-6) includes an integrated Data Service Unit/Channel Service Unit (DSU/CSU) and can be configured for either full T1 or fractionalized T1 services.

The Catalyst 4224 supports the WIC-1DSU-T1 card.

Figure 1-6   WIC-1DSU-T1—Front Panel View
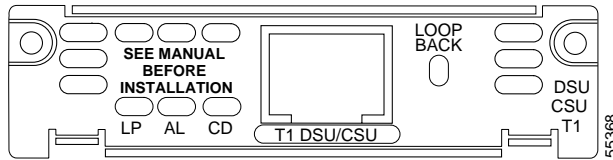
Two-Port Asynchronous/Synchronous Serial Card

The two-port asynchronous/synchronous (A/S) serial card (see Figure 1-7) provides an EIA/TIA-232, EIA/TIA-449, V.35, X.21, Data Terminating Equipment/Data Communication Equipment (DTE/DCE), EIA-530, or EIA-530A serial interface to a Catalyst 4224.

Note   The Catalyst 4224 supports only the 128 kbps synchronous link at this time.

The Catalyst 4224 supports the WIC-2A/S serial card.

Figure 1-7   WIC-2A/S—Front Panel View
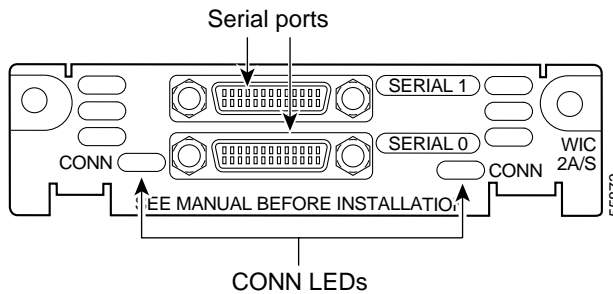
One-Port and Two-Port Serial Cards

The one- and two-port serial WAN interface cards provide serial connections to remote sites or legacy serial network devices such as SDLC concentrators, alarm systems, and POS devices. Data encapsulation occurs through Frame Relay. Both cards support speeds up to a maximum of 2.048 mbps.

The Catalyst 4224 supports the one-port WIC-1T serial card (see Figure 1-8). The WIC-1T supports these electrical interfaces when used with the appropriate transition cable: V.32, RS-232, RS-449, RS-530, and RS-530A in male and female versions for both DCE and DTE devices.

Figure 1-8   WIC-1T—Front Panel View
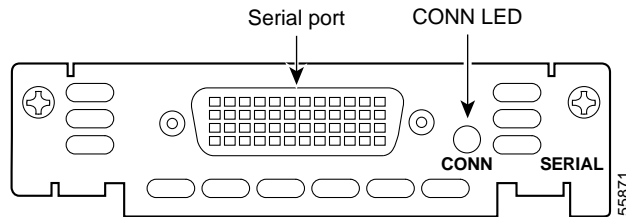
The Catalyst 4224 supports the two-port WIC-2T serial card (see Figure 1-9). You can configure each port on the WIC-2T independently of the other card, allowing support for different physical interfaces (protocol and DTE/DCE).

The WIC-2T supports a wide variety of electrical interfaces: V.32, RS-232, RS-449, RS-530, and RS-530A in male and female versions for both DCE and DTE devices.

Figure 1-9   WIC-2T—Front Panel View

Serial ports

CONN LEDs
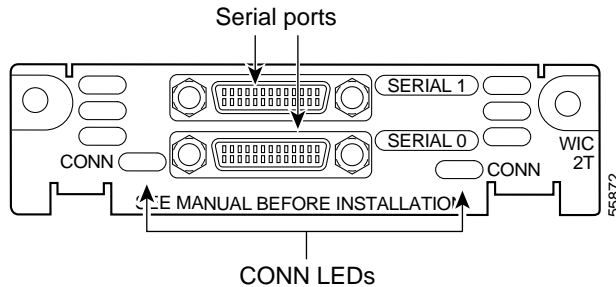
Voice Interface Cards

The Catalyst 4224 allows you to access the Public Switched Telephone Network (PSTN) through toll by-pass by using VICs.

The Catalyst 4224 supports two types of Foreign Exchange interface cards: FXS and FXO.

The two-port FXS analog interface card provides direct connections to a telephone. The eight-port FXS TM analog interface module provides service to analog phones and fax machines. The two-port FXO analog interface card provides connections to a central office (CO).

The Catalyst 4224 also supports a two-port ISDN BRI/ST card to provide a physical interface to an NT1 terminator.

For details on these voice interface cards, see the following sections:

Two-Port FXS Analog Interface Card

A two-port FXS interface card (see Figure 1-10) connects directly to a standard telephone or similar device. This interface supplies ringing voltage and dial tone to the station.

Note   The ports on this interface card are color-coded gray.

The Catalyst 4224 supports the VIC-2FXS card.

Figure 1-10   VIC-2FXS—Front Panel View
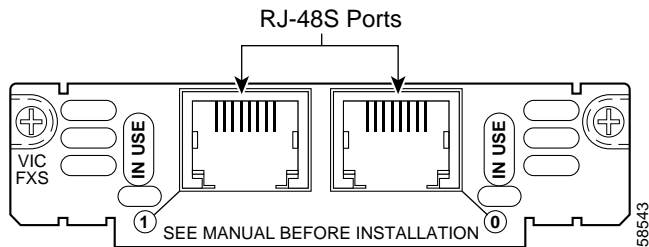
Eight-Port FXS RJ21 Analog Interface Card

The eight-port FXS RJ21 card (see Figure 1-11) is a high-density analog phone and fax relay interface that emulates a PSTN Central Office (CO) or a PBX.

Figure 1-11   Eight-Port FXS RJ21—Front Panel View
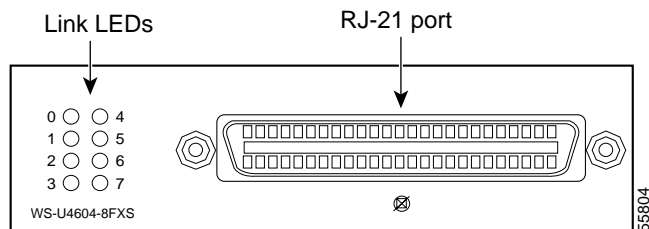
Two-Port FXO Analog Interface Card

A two-port FXO interface card connects local calls to a central office or a PBX. A standard telephone provides this interface.

Note The ports on this interface card are color-coded pink.

The Catalyst 4224 supports the following two-port FXO analog interface cards (see Figure 1-12):

- VIC-2FXO is intended for use in North America (United States, Canada, and Mexico).
- VIC-2FXO-EU is intended for use in Europe.

Figure 1-12   VIC-2FXO—Front Panel View
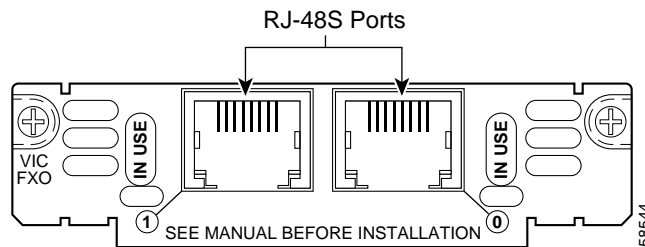
Two-Port ISDN BRI Card

The two-port ISDN BRI voice interface card (see Figure 1-13) provides a client-side ISDN S/T interface to connect to an NT1 terminating an ISDN telephone network. Each port can support two calls (one over each ISDN B channel), for a total of four calls per ISDN BRI card.

The Catalyst 4224 supports the VIC-2BRI-S/T-TE ISDN card.

Figure 1-13   VIC-2BRI-S/T-TE—Front Panel View
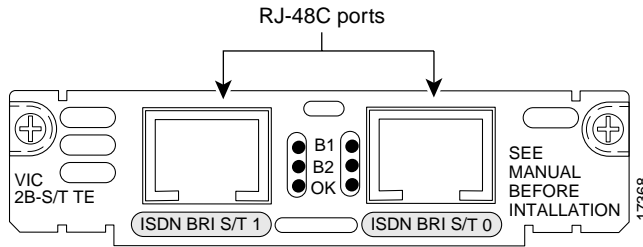
T1/E1 Multiflex Voice/WAN Interface Cards

Voice/WAN Interface Cards (VWICs) are multiflex trunk interface cards that provide voice and data access to the PSTN through TDM ports. Using VWICs, the Catalyst 4224 provides basic structured and unstructured service for fractional T1 networks, structured service for fractional E1 networks, and support for unstructured G.703. Each card includes an integrated DSU/CSU.

This section describes these cards:

One-Port Multiflex Trunk Interface Cards

The Catalyst 4224 supports these one-port multiflex trunk interface cards:

- VWIC-1MFT-T1 (see Figure 1-14)
- VWIC-1MFT-E1 (see Figure 1-15)
- VWIC-1MFT-G703 (see Figure 1-16) is intended to support unframed G.703. It also supports all the features of the other VWICs including drop and insert. Moreover, it provides the capability to configure one port for unframed G.703, while the other port is configured for standard framed E1.

You can distinguish between T1, E1 and G703 interface cards by the labeling on the faceplate. The label is beneath the port and next to the LEDs.

Figure 1-14   VWIC-1MFT-T1—Front Panel View

RJ-48C port

VWIC
1MFT-T1

AL
LP
CD

CTRLR T1 0

SEE
MANUAL
BEFORE
INSTALLATION

17856
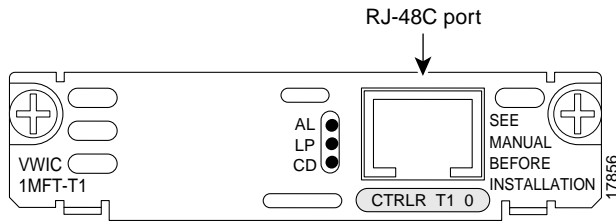
Figure 1-15   VWIC-1MFT-E1—Front Panel View

RJ-48C port

VWIC
1MFT-E1

AL
LP
CD

CTRLR E1 0

SEE
MANUAL
BEFORE
INSTALLATION

17857
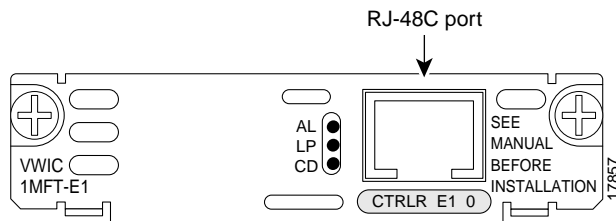
Figure 1-16   VWIC-1MFT-G703—Front Panel View

RJ-48C port

VWIC
1MFT-G703

AL
LP
CD

CTRLR T1 0

SEE
MANUAL
BEFORE
INSTALLATION

68610
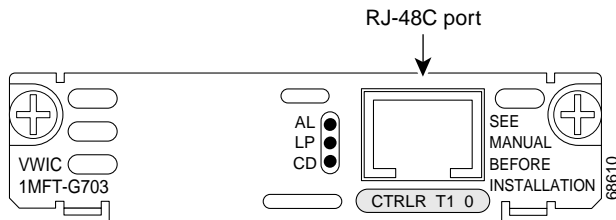
Two-Port Multiflex Trunk Interface Cards

The Catalyst 4224 supports these two-port multiflex trunk interface cards:

- VWIC-2MFT-T1 (see Figure 1-17)
- VWIC-2MFT-E1 (see Figure 1-18)

- VWIC-2MFT-T1-DI (see Figure 1-19)

- VWIC-2MFT-E1-DI (see Figure 1-20)

- VWIC-2MFT-G703 (see Figure 1-21) is intended to support unframed G.703. It also supports all the features of the other VWICs including drop and insert. Morevover, it provides the capability to configure one port for unframed G.703, while the other port is configured for standard framed E1.

Note The Catalyst 4224 does not support the drop-and-insert functions on the VWIC-2MFT-T1-DI and VWIC-2MFT-E1-DI cards.

Note You can distinguish between T1, E1, drop-and-insert, and G703 interface cards by the labeling on the faceplate.

Figure 1-17   VWIC-2MFT-T1—Front Panel View
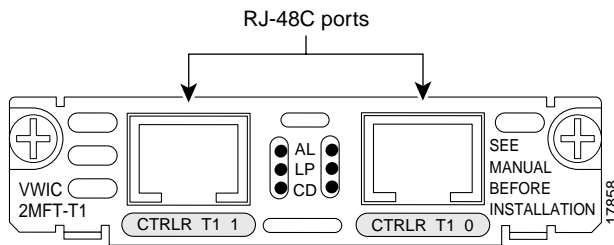
Figure 1-18   VWIC-2MFT-E1—Front Panel View
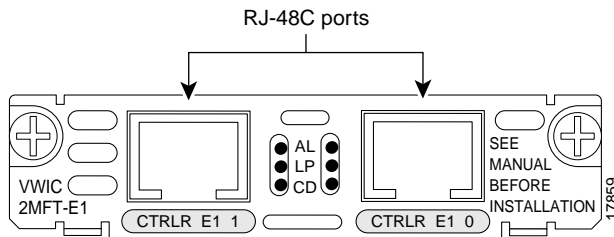
Figure 1-19   VWIC-2MFT-T1-DI—Front Panel View

RJ-48C ports

VWIC
2MFT-T1-DI

AL
LP
CD

SEE
MANUAL
BEFORE
INSTALLATION

CTRLR T1 1   CTRLR T1 0

17855
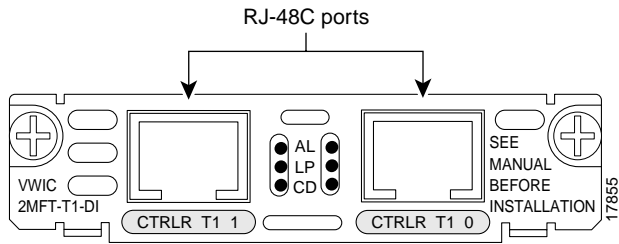
Figure 1-20   VWIC-2MFT-E1-DI—Front Panel View

RJ-48C ports

VWIC
2MFT-E1-DI

AL
LP
CD

SEE
MANUAL
BEFORE
INSTALLATION

CTRLR E1 1   CTRLR E1 0

17854
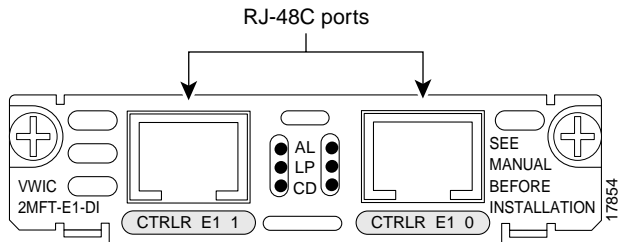
Figure 1-21   VWIC-2MFT-G703—Front Panel View

RJ-48C ports

VWIC
2MFT-G703

AL
LP
CD

SEE
MANUAL
BEFORE
INSTALLATION

CTRLR T1 1   CTRLR T1 0

68611
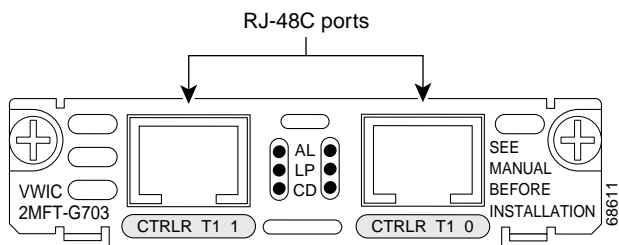
Preparing for Installation

This section describes how to prepare your site for installation of the Catalyst 4224 Access Gateway Switch. This section contains the following topics:

- Safety, page 2-1
- Site Requirements, page 2-2
- Site-Planning Checklist, page 2-3

Note See the "Site-Planning Checklist" section on page 2-3 to help ensure that you complete all site planning activities before you install the switch.

Safety

Warning Before you install, operate, or service the system, read *Regulatory Compliance and Safety Information for Catalyst 4200 Series Access Gateway Switch*. This guide contains important safety information you should know before working with the system.

Warning For Nordic countries (Norway, Finland, Sweden and Denmark) this system must be installed in a Restricted Access Location, where the voltage of the main ground connection of all equipment is the same (equipotential earth) and the system is connected to a grounded electrical outlet.

Site Requirements

This section provides site power requirements for the Catalyst 4224. You should verify site power before you install a switch.

The following sections are included:

- Environmental Requirements, page 2-2
- Power Requirements, page 2-2

✎

Note   For EMI recommendations, refer to the *Site Preparation and Safety Guide*.

Environmental Requirements

Table 2-1 describes the power requirements for the Catalyst 4224.

Unless otherwise noted, the information in Table 2-1 assumes worst-case conditions. Typical numbers are approximately 30 percent below the numbers listed here.

Table 2-1   Power Requirements Specifications

Model Number/ Module Type	Power Supply Output (Watts)	AC Input Power (Watts)	AC Input Current at 90 VAC (Amps)	AC Input Current at 120 VAC (Amps)	AC Input Current at 180 VAC (Amps)	AC Input Current at 240 VAC (Amps)
Catalyst 4224 Access Gateway Switch	240W	345W	3.8A	3A	2A	1.5A

Power Requirements

Knowing the power requirements can be useful for planning the power distribution system needed to support the switches. Heat dissipation specifications are an important consideration for sizing air-conditioning requirements for an installation.

Follow these requirements when preparing your site for the switch installation:

- Use the redundant power option to provide a second, identical power supply for the chassis in case one power supply fails or input power on one line fails.

- In systems configured with the redundant power option, connect each of the two power supplies to a separate input power source. If you fail to do this, your system might be susceptible to total power failure due to a fault in the external wiring or a tripped circuit breaker.

- To prevent a loss of input power, be sure the total maximum load on each circuit supplying the power supplies is within the current ratings of the wiring and breakers.

- In some systems, you might use an uninterruptible power supply (UPS) to protect against power failures at your site. Avoid UPS types that use ferroresonant technology.

Use the information in Table 2-1 to estimate the power requirements and heat dissipation of a Catalyst 4224.

Site-Planning Checklist

Table 2-2 lists the site-planning activities that you should complete before you install the Catalyst 4224. Completie each activity to help ensure a successful switch installation.

Table 2-2   Site-Planning Checklist

Task No.	Planning Activity	Verified By	Time	Date
1	Space evaluation: Space and layout Floor covering Impact and vibration Lighting Maintenance access			
2	Environmental evaluation: Ambient temperature Humidity Altitude Atmospheric contamination Airflow			
3	Power evaluation: Input power type Proximity of receptacle to the equipment Dedicated (separate) circuits for redundant power supplies UPS for power failures			
4	Grounding evaluation: Circuit breaker size			
5	Cable and interface equipment evaluation: Cable type Connector type Cable distance limitations Interface equipment (transceivers)			
6	EMI evaluation: Distance limitations for signaling Site wiring RFI levels			

Installing the Catalyst 4224 Access Gateway Switch

This section describes how to install the Catalyst 4224 Access Gateway Switch in a rack. For a first-time installation, perform the following procedures in the order listed:

Warning **Before you install, operate, or service the system, read *Regulatory Compliance and Safety Information for Catalyst 4200 Series Access Gateway Switch.* This guide contains important safety information you should know before working with the system.**

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

Before starting the installation procedures in this chapter, complete the site-planning checklist in Chapter 2, "Preparing for Installation."

Unpacking the Switch

Note   Do not discard the packing carton and other packing materials after you unpack the switch. Flatten the packing carton and store it. You will need the packing materials if you have to move or ship the switch in the future. Repacking instructions are provided in Appendix D, "Repacking the Catalyst 4224 Access Gateway Switch."

Check the contents of the accessory kit against the accessories checklist and the packing slip. Verify that you received all listed equipment, which should include the following:

- Switch hardware and software documentation
- Optional equipment such as network interface cables, transceivers, or special connectors

Installing the Rack-Mount Kit

This section describes how to install the rack-mount kit provided in the accessories box. The kit contains a shelf bracket and crossbar assembly that attaches directly to the rack and L brackets that attach to the switch chassis.

A standard rack-mount kit is included for mounting the switch in a standard 19-inch (48.3 cm) equipment rack with two unobstructed outer posts. This kit is not suitable for use with racks with obstructions (such as a power strip) that could impair access to switch field-replaceable units (FRUs).

Open the rack-mount kit and use the checklist in Table 3-1 to verify that all parts are included.

Rack-Mounting Guidelines

This section provides a rack-mounting checklist (see Table 3-1).

Table 3-1   Rack-Mount Kit Checklist

Part Description	Received
L brackets	2
M3 Phillips countersunk-head screws	
12-24 x 3/4-inch Phillips binder-head screws	
10-32 x 3/4-inch Phillips binder-head screws	
Shelf brackets	
Crossbar bracket	
M4 Phillips pan-head screws	4

Before rack-mounting the switch, ensure that the equipment rack complies with the following guidelines:

- The width of the rack, measured between the two front-mounting strips or rails, must be 17.75 inches (45.09 cm).

- The depth of the rack, measured between the front- and rear-mounting strips, must be at least 19.25 inches (48.9 cm) but not more than 32 inches (81.3 cm).

- The rack must have sufficient vertical clearance to insert the chassis. The chassis height is 2.5 rack units (RU) (about 3.4 inches).

Note   Chassis height is measured in RU.

Caution   If the rack is on wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized.

Required Tools

These tools and equipment are required to install the rack-mount kit:

- Number 1 and number 2 Phillips screwdrivers
- 3/16-inch flat-blade screwdriver
- Tape measure and level

These tools and equipment are required to install the switch chassis in a rack:

- Number 1 Phillips, number 2 Phillips, or a 3/16-inch flat-blade screwdriver
- Antistatic mat or antistatic foam
- Your own electrostatic discharge (ESD) grounding strap or the disposable ESD strap included with the switch

Note   For more information about ESD, refer to the *Site Preparation and Safety Guide*.

Installing the Switch

To install the Catalyst 4224 in a rack, follow these steps:

Procedure

Step 1   Prepare for installation as follows:

   a.   Place the Catalyst 4224 on the floor or on a sturdy table, as close as possible to the rack. Leave enough clearance to allow yourself room to move around the switch.

   b.   Use the tape measure to measure the depth of the rack. Measure from the outside of the front-mounting posts to the outside of the rear-mounting strip. The depth must be at least 19.25 inches (48.9 cm) and not greater than 32 inches (81.3 cm).

c. Measure the space between the inner edges of the left front- and right front-mounting posts to ensure that it is 17.75 inches (45.09 cm) wide. (The chassis is 17.5 inches [44 cm] wide and must fit between the mounting posts. (See Figure 3-1.)

d. Open the rack-mount kit and refer to the component checklist to verify that all parts are included.

Figure 3-1   Installing the Catalyst 4224 Access Gateway Switch in the Rack
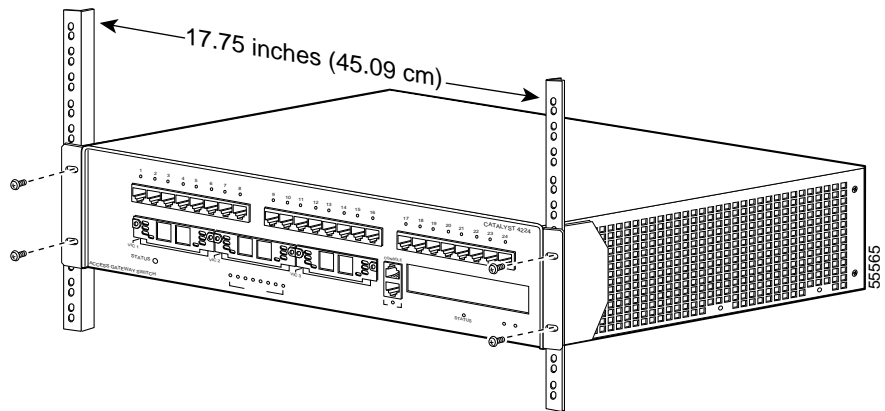
Note Some equipment racks have a power strip along the length of one of the rear posts. If the rack has this feature, consider the position of the strip when planning fastener points. Before installing the L brackets on the chassis, determine whether to install the chassis from the front or the rear of the rack.

Step 2 Attach the left and right L brackets using the four M4 Phillips pan-head screws provided in the rack-mount kit (see Figure 3-2).

Note The L brackets for the Catalyst 4224 are stamped with an L and an R to identify them as left and right.

The L brackets connect the switch chassis to the rack. You can mount the L brackets to the front- or rear-mounting holes of the chassis, depending on which end is in the front of the rack.

Figure 3-2   Attaching the L Brackets
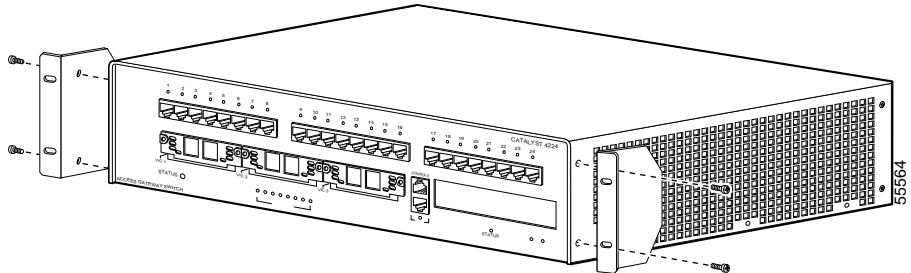
Note   Figure 3-1 illustrates how to attach the front of the switch to the rack. You can also attach the rear of the switch to the rack, depending on the configuration of your rack.

Step 3   Install the chassis in the rack as follows:

    a.   Position the switch chassis in the rack (see Figure 3-1):

       –   If the chassis front panel will be positioned in the front of the rack, insert the rear of the chassis between the mounting posts.

       –   If the rear of the chassis will be positioned in the front of the rack, insert the front of the chassis between the mounting posts.

    b.   Align the mounting holes in the L bracket with the mounting holes in the equipment rack.

    c.   Secure the chassis using four 12-24 x 3/4-inch screws through the elongated holes in the L bracket and into the threaded holes in the mounting post.

    d.   Use the tape measure and level to ensure that the chassis is installed straight and level.

Removing the Switch from the Rack

You might need to remove the Catalyst 4224, if there is a complete failure of the 8-port RJ21 FXS module, the power supply, or either of the two printed circuit board (PCB) assemblies or fans.

To remove the Catalyst 4224, follow these steps:

Procedure

Step 1   Detach the Catalyst 4224 from the rack by removing the 12-24 x 3/4-inch screws on the L bracket.

Step 2   Detach the left and right L brackets by removing the four M4 Phillips pan-head screws.

Step 3   Place the switch on the floor or on a sturdy table.

Connecting the System Ground

This section describes how to connect a system (earth) ground to the Catalyst 4224.

✎

Note   You must connect both the system and the power supply ground connections to an earth ground.

Two threaded M4 holes are provided on the chassis frame to attach the ground cable (see Figure 3-3).

Required Tools and Equipment

To connect the system ground, you need the following tools and materials:

✎

Note Materials are not provided; contact any commercial cable vendor for the required parts.

- Grounding lug—The grounding lug must have two M4 screw holes and accept 8 AWG wire.
- Two M4 (metric) hexagonal-head screws with locking washers
- One grounding wire—The grounding wire should be sized according to local and national installation requirements. The length of the grounding wires depends on the proximity of the switch to proper grounding facilities.
- Number 2 Phillips screwdriver
- Crimping tool
- Wire-stripping tool

Figure 3-3   Grounding Holes on the Catalyst 4224 Access Gateway Switch

M4 screw holes (2)
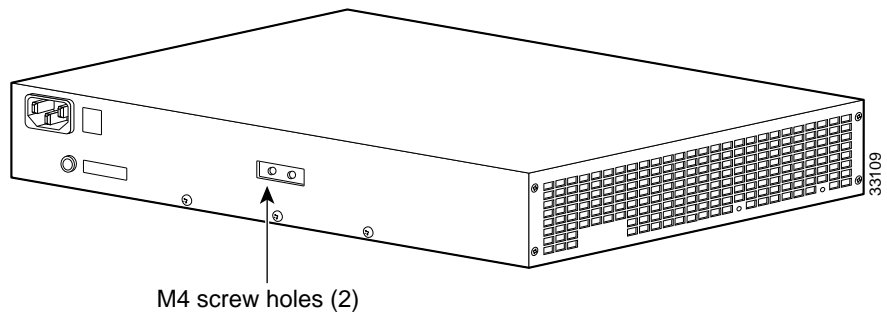
Connecting the System Ground

You must complete this procedure before connecting system power or turning on the Catalyst 4224.

To attach the grounding lug and cable to the grounding pad, perform these steps:

Procedure

Step 1   Use a wire-stripping tool to remove approximately 0.75 inch (19 mm) of the covering from the end of the grounding wire.

Step 2   Insert the stripped end of the grounding wire into the open end of the grounding lug.

Step 3   Use a crimping tool to secure the grounding wire in place in the grounding lug.

Step 4   Locate and remove the adhesive label from the system grounding pad on the switch.

Step 5   Place the grounding wire lug against the grounding pad, making sure there is good metal-to-metal contact.

Step 6   Secure the grounding lug to the chassis with two M4 screws. Ensure that the grounding lug will not interfere with other switch hardware or rack equipment.

Step 7   Prepare the other end of the grounding wire and connect it to an appropriate grounding point in your site to ensure adequate earth ground for the switch.

Connecting Power to the Switch

To connect power to the Catalyst 4224, follow these steps:

Procedure

Step 1   Before you connect the power supply to a power source, ensure that all site power and grounding requirements described in Chapter 2, "Preparing for Installation," have been met.

Step 2   Plug the power cord into the chassis.

Step 3   Connect the other end of the power cord to an AC-power input source.

Step 4   Verify power supply operation by checking the front panel power supply LEDs:

- When the power supply is operational, the LED is green.

- When the power supply has failed, the LED is orange.

From the system console, enter the **show system** command to display the power supply and system status. For more information on commands, refer to the *Cisco IOS Desktop Switching Command Reference*.

If the LEDs or the **show system** command indicate a power or other system problem, see Chapter 5, "Troubleshooting," for more information.

Connecting a Terminal to the Console Serial and Ethernet Management Ports

The console serial and Ethernet management ports are located on the front panel of the Catalyst 4224 (see Figure 1-2 on page 1-6).

These ports use an RJ-45 media-dependent interface crossed-over (MDIX) connector (see Figure 3-4). For more information about port pinouts and connectors, see Appendix A, "Technical Specifications."

Note The MDIX ports are crossed over internally. For an MDI-to-MDI or MDIX-to-MDIX connection, use a crossover cable. For an MDI-to-MDIX connection, use a straight-through cable, which allows the Tx pins to connect with the Rx pins.

Figure 3-4   10BaseTX RJ-45 Connector
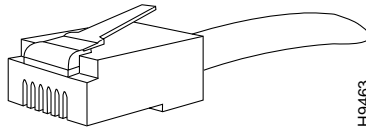
Verifying Switch Chassis Installation

After you finish connecting the modules, you need to verify that the switch has been installed correctly.

To verify the switch installation, perform these steps:

Procedure

Step 1   Verify that the ejector levers of each module are fully closed (parallel to the faceplate) to ensure that the supervisor engine and all switching modules are fully seated in the backplane connectors.

Step 2   Check the captive installation screws of each module, the power supply, and the fan assembly. Tighten any loose captive installation screws.

Step 3   Verify that all empty module slots have blank faceplates (WIC-BLANK-PANEL) installed and that the screws holding the plates in place are tight.

Step 4   Turn the power supply switches on to power up the system.

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

CHAPTER **4**

Installing the Catalyst 4224 Access Gateway Switch Interface Cards

This section describes how to install and connect interface cards in the Catalyst 4224 Access Gateway Switch. This section contains the following topics:

Warning **Before you install, operate, or service the system, read** *Regulatory Compliance and Safety Information for Catalyst 4200 Series Access Gateway Switch*. **This guide contains important safety information you should know before working with the system.**

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

Required Tools

You need these tools to install the interface cards:

- Flat-blade screwdriver
- Small flat-head screwdriver

- Number 1 and 2 Phillips screwdrivers

- Antistatic mat or foam

- ESD-preventive wrist strap or other grounding device

Installing Voice and WAN Interface Cards

The Catalyst 4224 has four slots reserved for WAN interface cards (WICs), voice interface cards (VICs), and T1/E1 multiflex voice/WAN interface cards (VWICs). You can install any combination of VICs, WICs, and VWICs in slots 1 and 2, but slot 3 accepts only VICs and VWICs. Slot 4 is filled with the high-density analog module when you first receive the switch.

⚠

Caution   You cannot swap an interface card without powering down the Catalyst 4224. If you fail to power down the switch, you will damage the interface cards.

⚠

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

⚠

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

⚠

Warning   **Incorrect connection of this or connected equipment to a general purpose outlet could result in a hazardous situation.**

⚠

Warning   **The telecommunications lines must be disconnected 1) before unplugging the main power connector and/or 2) while the housing is open.**

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

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

Warning   **Network hazardous voltages are present in the BRI, fractional T1/T1, and Switched 56 cables. If you detach the cable, detach the end away from the router first to avoid possible electric shock. Network hazardous voltages are also present in the area of the BRI (RJ-45), fractional T1/T1 (RJ-48C), and Switched 56 (RJ-11 or RJ-48S) ports, regardless of whether power is off or on.**

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

To install an interface card, perform these steps:

Procedure

Step 1   Remove all network interface cables, including telephone cables, from the front panel.

Step 2   If the Catalyst 4224 is on, you must power it off.

Caution   To channel ESD voltages to ground, do not unplug the power cable.

Step 3   Use either a number 2 Phillips screwdriver or a small flat-blade screwdriver to loosen the screws of the blank faceplate and remove the faceplate from the interface slot where you plan to install the card. Save the faceplate for future use.

Step 4   Align the card with the cable guides in the interface slot and slide the card gently into the slot.

Figure 4-1 shows how to insert a VIC or WIC into slot 2 of the Catalyst 4224.

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

Figure 4-1   Inserting a Voice or WAN Interface Card
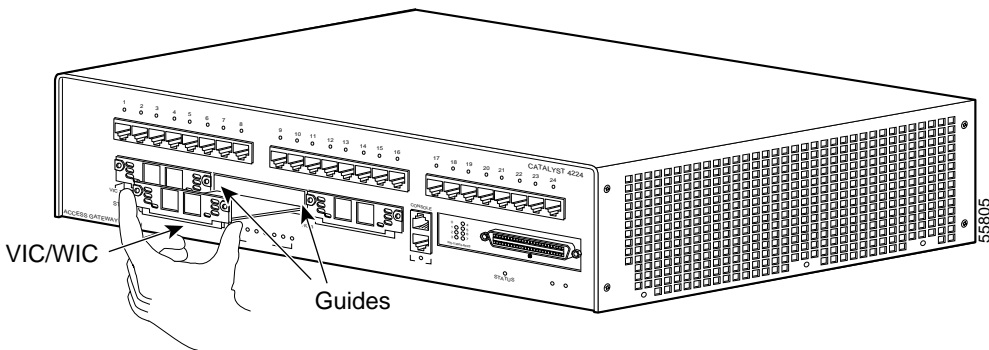
Step 5   Push the card into place until you feel its edge connector mate securely with the connector in the interface slot.

Step 6   Tighten the card's captive mounting screws into the holes in the Catalyst 4224 faceplate using a Phillips or a flat-blade screwdriver.

Step 7   Reinstall the network interface cables and power on the switch.

Connecting the Voice and WAN Interface Cards

These sections describe how to connect the supported VWICs, WICs, and VICs:

After you connect the cards, refer to the *Catalyst 4224 Access Gateway Switch Software Configuration Guide*.

WAN Interface Cards

This section describes the procedures for connecting the following WAN interface cards:

Connecting the One-Port 56/64-kbps DSU/CSU Cards

This section describes how to connect and verify the status of the one-port 56/64-kbps Data Service Unit/Channel Service Unit (DSU/CSU) interface cards (WIC-1DSU-56K).

Use a straight-through RJ-48S-to-RJ-48S or the straight-through RJ-48C-to-RJ-48C cable that shipped with the Catalyst 4224.
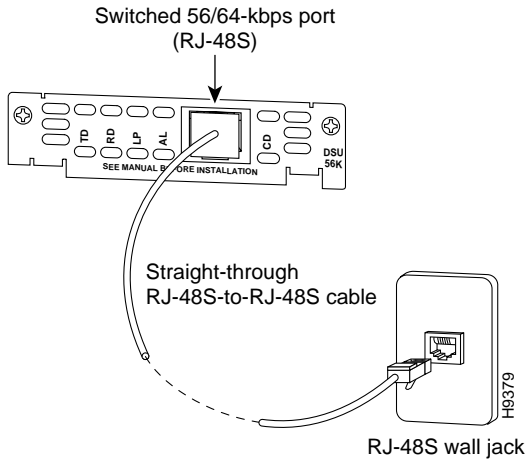
To connect the one-port 56/64-kbps DSU/CSU card, follow these steps:

Procedure

Step 1   Power off the Catalyst 4224.

Step 2   Connect one end of the cable to the 56/64-kbps port of the card, as shown in Figure 4-2.

Step 3 Connect the other end of the cable to the RJ-48S wall jack, as shown in Figure 4-2.

Figure 4-2   Connecting a 56/64-Kbps Card (WIC-1DSU-56K)

Step 4 Power on the Catalyst 4224.

Step 5 Verify that the CD LED is green, indicating that the internal DSU/CSU is communicating with another DSU/CSU.

Table 4-1 describes the 56/64-kbps WAN interface card LEDs.

Table 4-1   56/64-kbps WAN Interface Card LEDs

LED	Description
TD	Green indicates that data is being transmitted to the DTE interface.
RD	Green indicates that data is being received from the DTE interface.
LP	Yellow indicates that the internal DSU/CSU is in loopback mode. This LED is off during normal operation.

Table 4-1   56/64-kbps WAN Interface Card LEDs (continued)

LED	Description
AL	Yellow indicates that one of these alarm conditions is present: no receive signal, loss of frame signal from the remote station, or an out-of-service signal from the remote station. This LED is off during normal operation.
CD	Green indicates that the internal DSU/CSU in the WIC is communicating with another DSU/CSU. This LED is off during normal operation.

Connecting the One-Port T1/FT1 DSU/CSU Cards

This section describes how to connect and verify the status of the one-port T1/FT1 DSU/CSU interface card (WIC-1DSU-T1).

Use a straight-through RJ-48S-to-RJ-48S or the straight-through RJ-48C-to-RJ-48C cable that shipped with the Catalyst 4224.

To connect the one-port T1/FT1 card, follow these steps:

Procedure

Step 1   Power off the Catalyst 4224.

Step 2   Connect one end of the cable to the T1/FT1 port of the card, as shown in Figure 4-3.

Step 3   Connect the other end of the cable to the RJ-48S wall jack, as shown in Figure 4-3.

Figure 4-3   Connecting a T1/FT1 Card (WIC-1DSU-T1)
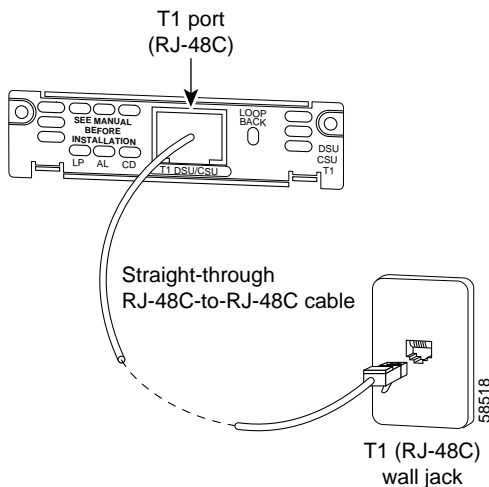
Step 4   Power on the Catalyst 4224.

Step 5   Verify that the CD LED is green, indicating that the internal DSU/CSU in the card is communicating with another DSU/CSU.

Table 4-2 describes the T1/FT1 WAN interface card LEDs.

Table 4-2   T1/FT1 WAN Interface Card LEDs

LED	Description
LP	Yellow indicates that the internal DSU/CSU is in loopback mode. This LED is off during normal operation.
AL	Yellow indicates that one of these alarm conditions is present: no receive signal, loss of frame signal from the remote station, or an out-of-service signal from the remote station. This LED is off during normal operation.
CD	Green indicates that the internal DSU/CSU in the WIC is communicating with another DSU/CSU. This LED is off during normal operation.

Connecting the Two-Port Asynchronous/Synchronous Serial Cards

This section describes how to connect and verify the status of two-port asynchronous/synchronous (A/S) serial cards (WIC-2A/S).

Note The Catalyst 4224 does not support asynchronous mode operation at this time.

The two-port A/S serial card has "smart" serial ports. The serial cable attached to one of the card's ports can determine the electrical interface type and mode (DTE or DCE).

Six types of serial cables (also called serial adapter cables or serial transition cables) are available from Cisco Systems for use with the two-port A/S serial card:

- EIA/TIA-232 serial cable assembly
- EIA/TIA-449 serial cable assembly
- V.35 serial cable assembly
- X.21 serial cable assembly
- EIA/TIA-530 serial cable assembly
- EIA/TIA-530A serial cable assembly

All serial cables have a universal plug at the interface card end. The network end of each cable provides the physical connectors that are most commonly used for the interface. For example, the network end of the EIA/TIA-232 serial cable is a DB-25 connector, which is the most widely used EIA/TIA-232 connector.

All serial interface types, except EIA-530, are available in DTE or DCE mode: DTE with a plug connector at the network end and DCE with a receptacle at the network end. The V.35 assembly is available in either mode with either gender at the network end. The EIA/TIA-530 assembly is available in DTE only.

After you install the two-port A/S serial card, use the appropriate serial cable to connect the serial port on the card to one of the following types of equipment (see Figure 4-4):

- Synchronous modem
- DSU/CSU
- Other DCE, if connecting to a digital WAN line

To connect the two-port A/S serial card, follow these steps:

Procedure

Step 1   Power off the Catalyst 4224.

Step 2   Connect one end of the appropriate serial cable to a DB-60 port on the card, as shown in Figure 4-4.

Step 3   Connect the other end of the cable to the appropriate type of equipment, as shown in Figure 4-4.

Step 4   Power on the Catalyst 4224.

Step 5   Verify that the CONN LED goes on, indicating that the serial port on the card detects the WAN serial connection.

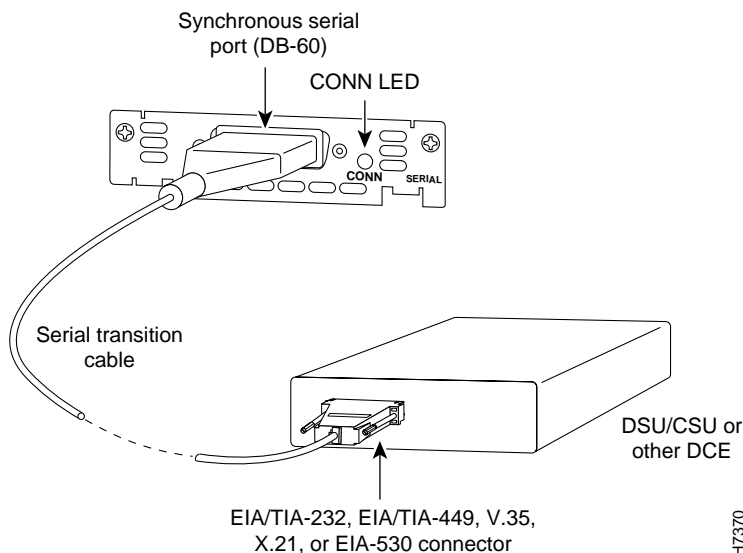*Figure 4-4   Connecting a Two-Port A/S Serial Card (WIC-2A/S)*

Table 4-3 describes the two-port A/S serial interface card LED.

Table 4-3   Asynchronous/Synchronous WAN Interface Card LED

LED	Description
CONN	Green indicates that the serial port detects a WAN serial connection.

Connecting the One-Port and two-port Serial Cards

This section describes how to connect and verify the status of the 1- and two-port serial cards (WIC-1T and WIC-2T).

✎

Note   The Catalyst 4224 does not support asynchronous mode operation at this time.

The two-port A/S serial card has "smart" serial ports. The serial cable attached to one of the card's ports can determine the electrical interface type and mode (DTE or DCE).

Six types of serial cables (also called serial adapter cables or serial transition cables) are available from Cisco Systems for use with the two-port A/S serial card:

- EIA/TIA-232 serial cable assembly
- EIA/TIA-449 serial cable assembly
- V.35 serial cable assembly
- X.21 serial cable assembly
- EIA/TIA-530 serial cable assembly
- EIA/TIA-530A serial cable assembly

All serial cables provide a universal plug at the interface card end. The network end of each cable provides the physical connectors that are most commonly used for the interface. For example, the network end of the EIA/TIA-232 serial cable is a DB-25 connector, which is the most widely used EIA/TIA-232 connector.

All serial interface types except EIA-530 are available in the following DTE or DCE mode: DTE with a plug connector at the network end and DCE with a receptacle at the network end. The V.35 assembly is available in either mode with either gender at the network end. The EIA/TIA-530 assembly is available in DTE only.

After you install the two-port A/S serial card, use the appropriate serial cable to connect the serial port on the card to one of the following types of equipment (see Figure 4-5):

- Synchronous modem
- DSU/CSU
- Other DCE, if connecting to a digital WAN line

To connect either the 1- or two-port serial card, follow these steps:

Procedure

Step 1   Power of the Catalyst 4224.

Step 2   Connect one end of the appropriate serial cable to a DB-60 port on the card, as shown in Figure 4-5.

Step 3   Connect the other end of the cable to the appropriate type of equipment, as shown in Figure 4-5.

Figure 4-5   Connecting a 1- Port Serial Card (WIC-1T)
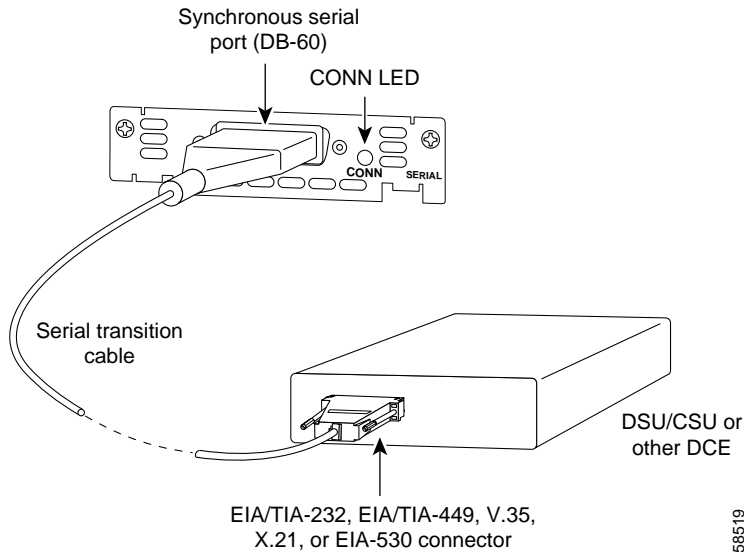
Step 4   Power on the Catalyst 4224.

Step 5   Verify that the CONN LED goes on, indicating that the serial port on the card detects the WAN serial connection.

Table 4-4 describes the serial WAN interface card LED.

Table 4-4   Serial WAN Interface Card LED

LED	Description
CONN	Green indicates that the serial port detects the WAN serial connection.

Voice Interface Cards

This section describes how to connect the following voice interface cards:

- Connecting the Two-Port FXS Voice Interface Cards, page 4-14
- Connecting the Eight-Port RJ21 FXS Voice Interface Cards, page 4-16

Connecting the Two-Port FXS Voice Interface Cards

This section describes how to connect and verify the status of the two-port Foreign Exchange Station (FXS) voice interface card (VIC-2FXS or VIC-2FXS-EU).

Setting the Jumpers on the Two-Port FXS Card

The two-port FXS voice interface card has two jumper headers (W3 and W4) that you can use to set loop-start or ground-start mode. One jumper configures each FXS port. The default setting is loop start. In the default setting, jumpers are placed over positions 2 and 3 of headers W3 and W4.

Most modern central office (CO) equipment, such as the DMS-100 and 5ESS switches, provides the calling party control (CPC) and Ring on Seize (RoS) features on loop-start lines. CPC provides faster disconnection, and RoS minimizes glare (collision of inbound and outbound calls on the same interface). If your CO does not provide these features on loop-start wires, you may want to configure the FXS card for ground-start operation instead by moving the jumpers to positions 1 and 2.

For proper operation, you must configure both jumpers identically. In most cases, the jumper setting should have little or no effect on operation.

> **Note** Jumper settings apply only to VIC-2FXS.

Connecting the Two-Port FXS Card

Use a standard RJ-11 modular telephone cable to connect the two-port FXS card to the PSTN or PBX through a telephone jack.

To connect the two-port FXS card, follow these steps:

Procedure

Step 1 Power off the Catalyst 4224.

Step 2 Connect one end of the cable to one of the RJ-11 ports of the card, as shown in Figure 4-6.

Step 3 Connect the other end of the cable to the RJ-11 wall jack, as shown in Figure 4-6.

Figure 4-6   Connecting a Two-Port FXS Card (VIC-2FXS)
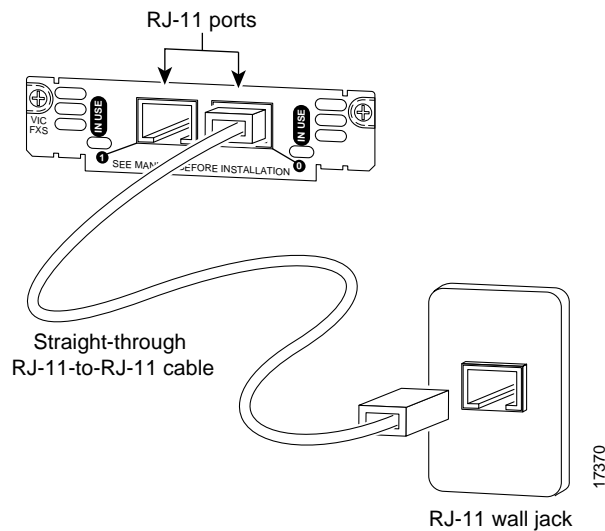
Step 4 Power on the Catalyst 4224.

Step 5 Check that the LED is green.

Table 4-5 describes the FXS voice interface card LED.

Table 4-5   FXS Voice Interface Card LED

LED	Description
IN USE	Green indicates that an off-hook has been detected. Off indicates that an on-hook has been detected.

The VIC-2FXS-EU voice interface card is intended for use in Europe. In countries where PSTNs do not use RJ-11 wall jacks, use a suitable adapter to convert the plug on an RJ-11 modular cable to the type of wall jack connector that is used in your country. These adapters are not sold by Cisco Systems but are available from other vendors.

⚠

Caution   Connect only an FXS interface that is approved for use in your country to the PSTN. Otherwise, connect the FXS interface only to a PBX.

## Connecting the Eight-Port RJ21 FXS Voice Interface Cards

This section describes how to connect and verify the status of an eight-port RJ21 FXS module (WS-U4604-8FXS).

This section describes the following topics:

RJ-21 Connectors

Figure 4-7 shows examples of the RJ-21 telco connector for the RJ-21 port on the eight-port FXS module. The connectors are available in three cable-to-connector orientations: 90 degrees, 110 degrees, and 180 degrees.

Figure 4-7   RJ-21 Category 5 Telco Interface Cable Connectors
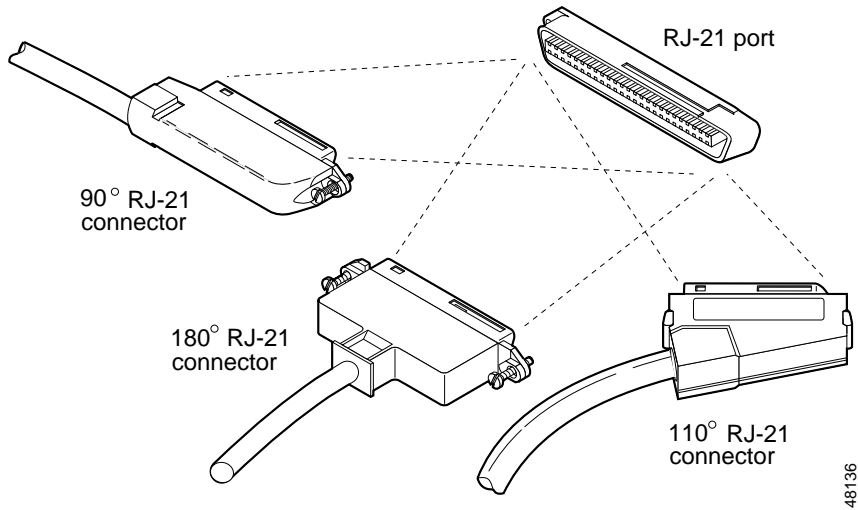
Because 90-degree RJ-21 connectors have only one screw, they require additional support to hold one side of the connector to the module. Cisco supplies a bracket and a velcro strap in the accessory kit (see Figure 4-8) for this purpose.

Figure 4-8   Bracket and Velcro Strap for the RJ-21 Category 5 Telco Interface Cable Connector
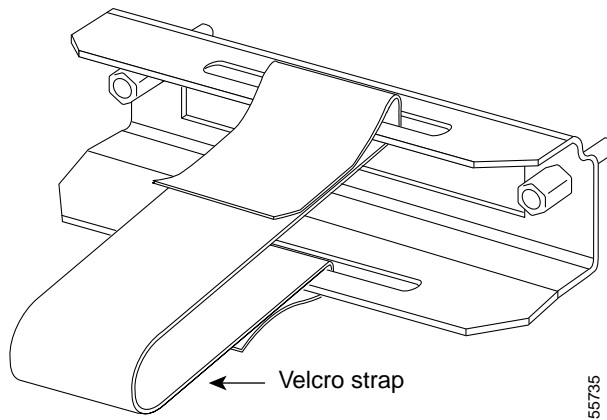
To attach the bracket to the eight-port FXS module, follow these steps:

Procedure

Step 1   Remove the two screws from the eight-port FXS module front panel with a flat-blade screwdriver.

Step 2   Align the screws on the bracket with the holes on the eight-port FXS module, and then tighten them.

Step 3   Align the screw on the 90 degrees RJ-21 connector with the appropriate screw top on the bracket, and then tighten the screw.

Step 4   Attach the velcro strap as illustrated in Figure 4-9.

Connecting the Eight-Port RJ21 FXS Module

Use a standard RJ-21 Category 5 telco connector and cable to connect the eight-port FXS module jack to the breakout box.

To connect the eight-port RJ21 FXS module, follow these steps:

Procedure

Step 1   Power off the Catalyst 4224.

Step 2   Connect one end of the RJ-21 cable to a telco RJ-21, as shown in Figure 4-9.

Step 3   Connect the other end of the cable to the breakout box or patch panel, as shown in Figure 4-9.

Step 4   Power off the Catalyst 4224.

Step 5   Verify that the HDA LED is green. This LED indicates that Cisco IOS is running.

⚠
Caution   Do not directly connect Octel voice mail servers to the eight-port FXS module. You must first connect the servers to a patch panel. Every alternate output port on the Octel voice mail server is a pair of grounds. (The ring-tip pairs are not defined as port 0, port 1, and so

on. Instead, they are defined as port 0, ground/ground, port 1, ground/ground, and so on.) Connecting these grounds directly to the FXS module results in shorting every alternate port on the module to ground.

Warning   **If the symbol of suitability with an overlaid cross appears above a port, you must not connect the port to a public network that follows the European Union standards. Connecting the port to this type of public network can cause severe injury or damage your router.**

Figure 4-9   Connecting an Eight-Port RJ21 FXS Module (WS-U4604-8FXS) to a Breakout Box
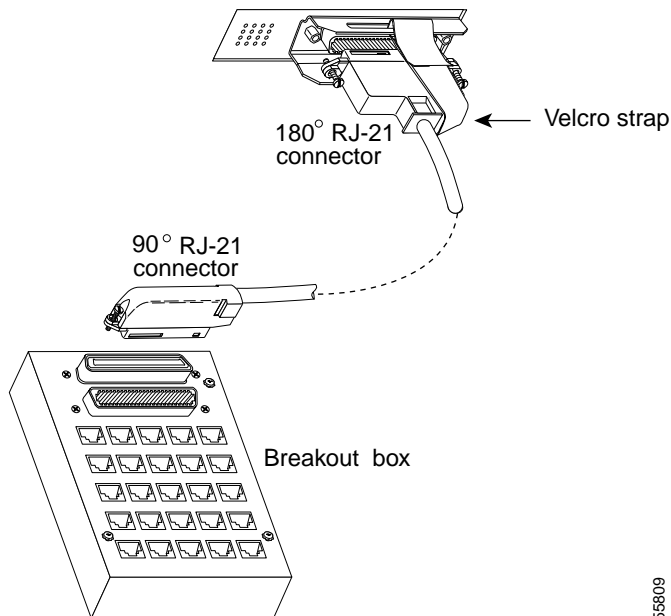
Table 4-6 describes the eight-port RJ21 FXS module link LED.

Table 4-6   Eight-Port RJ21 FXS Module Link LED

LED	Description
Link	Green indicates that the telephone or fax machine is off-hook. Off indicates that the port is not active (connected device is on-hook) or that the link is not connected

Figure 4-10 shows the pinout convention for the telco RJ-21 (tip and ring on 25 pairs). The top row is ring, the bottom row is tip. For the eight-port FXS module, only the eight pairs to the right are used. The middle set of eight pairs is shorted together but not to ground.

Figure 4-10   Pinout Convention for the Telco RJ-21
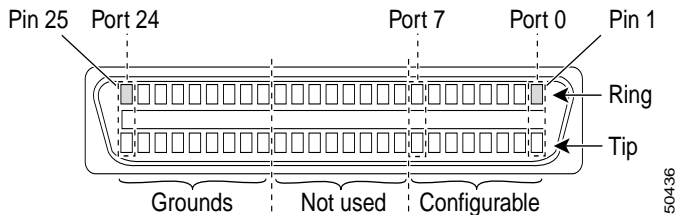
See Table B-3 in Appendix B, "Connector and Cable Specifications," for a mapping of the RJ-21 pinouts for the eight-port FXS module connector.

Connecting the Two-Port FXO Voice Interface Cards

This section describes how to connect and verify the status of the two-port FXO voice interface cards (VIC-2FXO, VIC-2FXO-EU).

Setting the Jumpers on the Two-Port FXO Card

The two-port FXO voice interface card includes two jumper headers (W3 and W4) that you can use to set loop-start or ground-start mode. One jumper configures each FXO port. The default setting is loop start. In the default setting, jumpers are placed over positions 2 and 3 of headers W3 and W4.

Updated modern CO equipment, such as the DMS-100 and 5ESS switches, provides the CPC and RoS features on loop-start lines. CPC provides faster disconnection, and RoS minimizes glare (collision of inbound and outbound calls on the same interface). If your CO does not provide these features on loop-start lines, you may want to configure the FXO card for ground-start operation instead by moving the jumpers to positions 1 and 2.

For proper operation, you must configure both jumpers identically. In most cases, the jumper setting should have little or no effect on operation.

Note   This jumper setting does not apply to VIC-2FXO-EU.

Connecting the Two-Port FXO Card

Use a standard RJ-11 modular telephone cable to connect the two-port FXO card to the PSTN or PBX through a telephone jack. To connect the two-port FXO card, follow these steps:

Procedure

Step 1   Power off the Catalyst 4224.

Step 2   Connect one end of the cable to one of the RJ-11 ports of the card, as shown in Figure 4-11.

Step 3   Connect the other end of the cable to the RJ-11 wall jack, as shown in Figure 4-11.

Figure 4-11   Connecting a Two-Port FXO Card (VIC-2FXO)
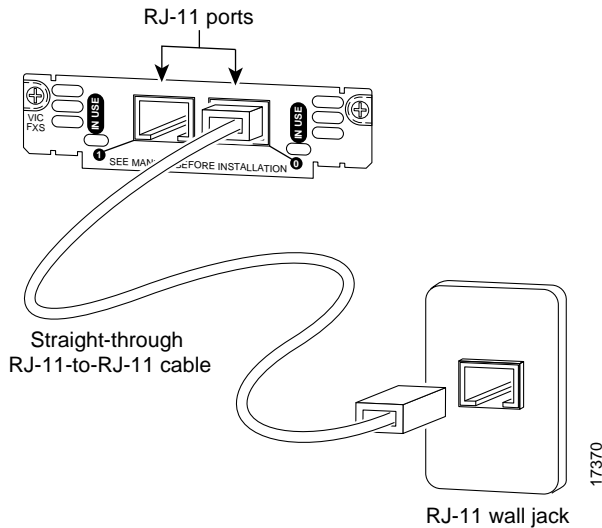
Step 4   Power on the Catalyst 4224.

Step 5   Check that the IN USE LED is green, indicating that the line is in use.

Table 4-7 describes the FXO voice interface card LED.

Table 4-7   FXO Voice Interface Card LED

LED	Description
IN USE	Green indicates that the line is in use.

The VIC-2FXO-EU voice interface card is intended for use in Europe. In countries where PSTNs do not use RJ-11 wall jacks, use a suitable adapter to convert the plug on an RJ-11 modular cable to the type of wall outlet connector that is used in your country. These adapters are not sold by Cisco Systems but are available from other vendors.

⚠

Caution   Connect only an FXO interface that is approved for use in your country to the PSTN. Otherwise, connect the FXO interface only to a PBX. Connections from the PBX to the PSTN are permitted.

Connecting the Two-Port ISDN BRI Cards

This section describes how to connect and verify the status of the two-port ISDN BRI cards (VIC-2BRI-S/T-TE).

Use the straight through RJ-48C-to-RJ-48C cable that shipped with your Catalyst 4224.

To connect the two-port ISDN BRI card, follow these steps:

Procedure

Step 1   Power off the Catalyst 4224.

Step 2   Connect one end of the cable to one of the RJ-48C ports of the card, as shown in Figure 4-12.

Step 3   Connect the other end of the cable to one of the RJ-48C S/T ports on an NT1 device, as shown in Figure 4-12.

⚠

Caution   To prevent damage to the switch, be sure to connect the cable to the BRI connector only. Do not connect the cable to any other RJ-48C connector.

Figure 4-12   Connecting a Two-Port ISDN BRI Card (VIC-2B-S/T TE)
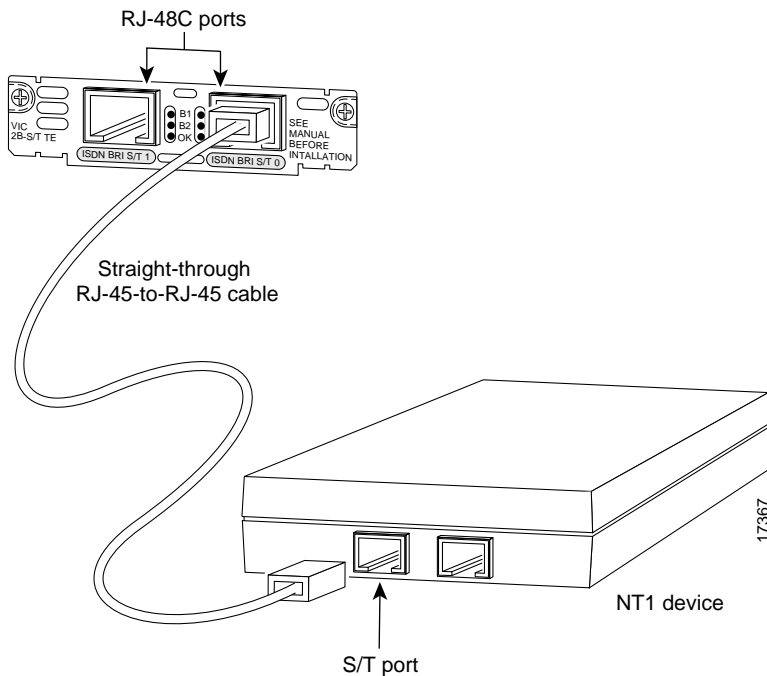
Step 4 Power on the Catalyst 4224.

Step 5 Check that the OK LED is green, indicating that the card is connected to an ISDN network.

Table 4-8 describes the ISDN BRI voice interface card LEDs.

Table 4-8   ISDN BRI Voice Interface Card LEDs

LED	Description
B1	Green indicates that the call is active on the B1 channel.
B2	Green indicates that the call is active on the B2 channel.
OK	Green indicates that the interface card is connected to an ISDN network. This LED is on during normal operation.

T1/E1 Multiflex Voice/WAN Interface Cards

This section describes how to connect the following interface cards:

- Connecting the One-Port Multiflex Trunk Interface Cards, page 4-25
- Connecting the Two-Port Multiflex Trunk Interface Cards, page 4-27

Connecting the One-Port Multiflex Trunk Interface Cards

This section describes how to connect and verify the status of the one-port multiflex trunk interface cards (VWIC-1MFT-T1, VWIC-1MFT-E1, or VWIC-1MFT-G703).

Use the straight-through RJ-48C-to-RJ-48C cable that shipped with the Catalyst 4224.

To connect the one-port multiflex trunk interface card, follow these steps:

Procedure

Step 1   Power off the Catalyst 4224.

Step 2   Connect one end of the cable to the RJ-48C port of the card, as shown in Figure 4-13.

Step 3   Connect the other end of the cable to the RJ-48C wall jack at your site, as shown in Figure 4-13.

Figure 4-13   Connecting a One-Port Multiflex Trunk Interface Card (VWIC-1MFT-T1)
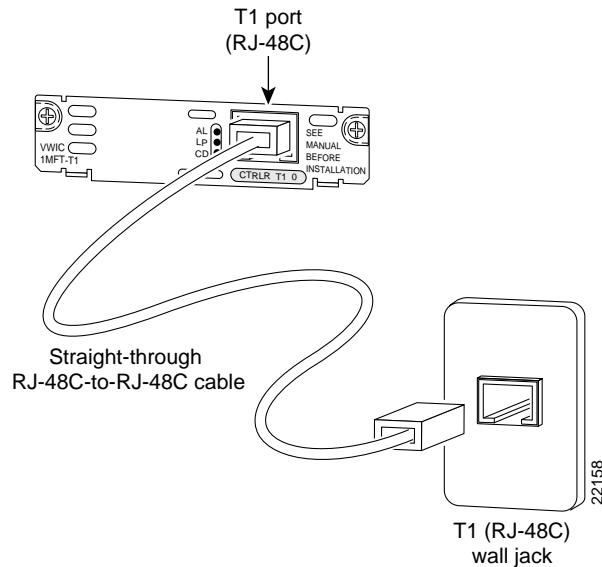
Step 4   Power on the Catalyst 4224.

Step 5   Verify that the CD LED is green, indicating that the card's internal DSU/CSU is communicating with the DSU/CSU at the T1 or E1 service provider's CO.

Table 4-9 describes the one-port multiflex trunk interface card LEDs.

Table 4-9   One-Port Multiflex Trunk Interface Card LEDs

LED	Description
AL	Yellow indicates that there is a local or remote alarm state. This LED is off during normal operation.
LP	Yellow indicates that a loopback or line state has been detected or has been manually set by the user. This LED is off during normal operation.
CD	Green indicates that a carrier has been detected and that the internal DSU/CSU in the card is communicating with another DSU/CSU. This LED is on during normal operation.

Connecting the Two-Port Multiflex Trunk Interface Cards

This section describes how to connect and verify the status of the two-port multiflex trunk interface cards (VWIC-2MFT-T1, VWIC-2MFT-E1, VWIC-2MFT-T1-DI, VWIC-2MFT-E1-DI, or VWIC-2MFT-G703).

Use the straight-through RJ-48C-to-RJ-48C cable that shipped with the Catalyst 4224.

To connect the two-port multiflex trunk interface card, follow these steps:

Procedure

Step 1   Power on the Catalyst 4224.

Step 2   Connect one end of the cable to one of the RJ-48C ports of the card, as shown in Figure 4-14.

Step 3   Connect the other end of the cable to the T1 or E1 (RJ-48C) wall jack at your site, as shown in Figure 4-14.

Figure 4-14   Connecting a Two-Port Multiflex Trunk Interface Card (VWIC-2MFT-E1-DI)
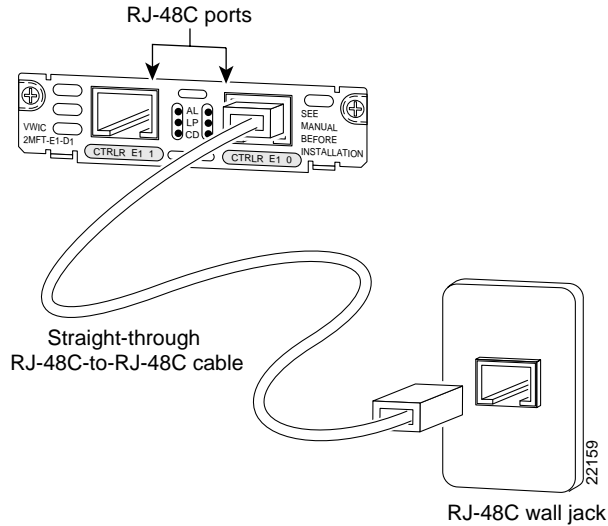
Step 4   Turn on power to the switch.

Step 5   Verify that the CD LED is green, indicating that the card's internal DSU/CSU is communicating with the DSU/CSU at the T1 or E1 service provider CO.

Table 4-10 describes the two-port multiflex interface card LEDs.

Table 4-10   two-Port Multiflex Trunk Interface Card LEDs

LED	Description
AL	Yellow indicates that there is a local or remote alarm state. This LED is off during normal operation.
LP	Yellow indicates that a loopback or line state has been detected or has been manually set by the user. This LED is off during normal operation.
CD	Green indicates that a carrier has been detected and that the internal DSU/CSU in the card is communicating with another DSU/CSU. This LED is on during normal operation.

Connecting the Voice and WAN Interface Cards

5

Troubleshooting

This section describes how to troubleshoot the Catalyst 4224 Access Gateway Switch. This section describes the LEDs that indicate port connectivity problems and overall switch performance.

Note You can obtain statistics about your switch from the browser interface, from the command-line interface (CLI), or from a Simple Network Management Protocol (SNMP) workstation. Refer to the *Cisco IOS Desktop Switching Software Configuration Guide*, the *Cisco IOS Desktop Switching Command Reference* (online only), or the documentation that came with your SNMP application for details.

Common switch problems fall into the following categories:

- Poor performance
- No connectivity
- Corrupted software

Table 5-1 describes how to detect and resolve these common problems.

Table 5-1   Common Problems and Solutions

Symptom	Possible Cause	Resolution
Poor performance or excessive errors.	Duplex auto-negotiation mismatch.	Refer to the *Cisco IOS Desktop Switching Software Configuration Guide* for information on identifying auto-negotiation mismatches.

	Cabling distance exceeded.
	
	• Port statistics show excessive frame check sequence (FCS), late-collision, or alignment errors.
	
	• For 100BaseTX connections:
	  – The distance between the port and the attached device exceeds 100 meters.
	  – If the switch is attached to a repeater, the total distance between the two end stations exceeds the 100Base-T cabling guidelines.
	
	• For 10BaseT connections: The distance between the port and the attached device exceeds 100 meters.
		• Refer to the *Cisco IOS Desktop Switching Software Configuration Guide* for information on displaying port statistics.
		
		• Reduce the cable length to within the recommended distances.
		
		Refer to your 100BaseT repeater documentation for cabling guidelines.
		
		• Reduce the cable length to within the recommended distances.

	Bad adapter in attached device. • Excessive errors are found in port statistics. • Spanning Tree Protocol is checking for possible loops.	• Run the adapter card diagnostic utility. • Wait 30 seconds for the LED to turn green.

Table 5-1   Common Problems and Solutions (continued)

Symptom	Possible Cause	Resolution
No connectivity.	**Incorrect or bad cable.** The following causes are indicated by no link at both ends: • A crossover cable was used when a straight-through cable was required, or vice-versa. • The cable is wired incorrectly. • Spanning Tree Protocol is checking for possible loops.	• For the correct pinouts and the proper application of crossover versus straight-through cables, see the "Crossover and Straight-Through Cable Pinouts" section on page B-4. • Replace with a tested good cable. • Wait 30 seconds for the LED to turn green.
Unreadable characters on the management console.	Incorrect baud rate was detected.	Reset the emulation software to 9600 baud.
System LED is amber.	LED is amber until the system is online. Once online, the LED is green. If the POST fails or the system is overheating, the status LED is red.	Check the POST errors logged on the console.

Table 5-1   Common Problems and Solutions (continued)

Symptom	Possible Cause	Resolution
System LED is red.	• Switch is overheating.	• Use the **show env** command to check if an over-temperature condition exists. If it does: – Place the switch in an environment that is within 32 to 113°F (0 to 45°C). – Make sure fan intake and exhaust areas are clear. If a multiple-fan failure is causing the switch to overheat, replace the switch.
	• Nonfatal or fatal POST error detected.	• Check the POST errors logged on the console.
Cisco IP Phone fails to power on when connected to a Catalyst 4224.	Improper cabling.	Make sure the switch is connected to the LAN-to-phone jack on the Cisco IP Phone.

Technical Specifications

This section provides the technical specifications for the Catalyst 4224 Access Gateway Switch.

This section includes the following topics:

Catalyst 4224 Specifications

Table A-1 lists the Catalyst 4224 specifications.

Table A-1   Technical Specifications for the Catalyst 4224 Access Gateway Switch

Item	Specification
Environmental	
Temperature ambient operating	32°F (0°C) to 104°F (40°C)
Temperature ambient nonoperating and storage	−13 to 158°F (−25 to 70°C)
Relative humidity	5-90% noncondensing
Operating altitude	Up to 6500 ft (2000m)

Table A-1   Technical Specifications for the Catalyst 4224 Access Gateway Switch (continued)

Item	Specification
Switching Components	
Processor Type	MPC8260 with 200-MHz 603e core
Performance	35,000 pps @ 64-byte Layer 3, 3.3-Mpps Layer 2 switch
Flash memory	32 MB
System memory (DRAM)	64 MB
VIC/WIC slots	2 (first and second slot support VIC or WIC cards)
VIC slots	1 (third slot is VIC only)
Console port	1 (up to 115.2 kbps)
10BASE-T/100BASE-TX management port	1
Onboard LAN ports	24 10BASE-T/100BASE-TX auto-sensing full-duplex ports
Onboard FXS ports	8 (RJ-21 connector)
Redundant Power Supply Support (RPS 300)	Yes
MAC addresses	1024
Hardware encryption	Included onboard
Rack-mounting	Yes
Physical Characteristics	
Dimensions (H x W x D)	3.42 x 17.17 x 14.3 in.
Weight (without VIC/WIC cards)	16.5 lb (7.6 kg)
AC Power	
Power supply	240W -12V/-48V AC-DC supply
Output	12V @ 8A, -48V @ 3A
AC-input voltage	100 to 240VAC
Frequency	50 to 60Hz
AC input current	4A max @ 100VAC; 2A max @ 240VAC
Airflow	Right side in, left side out

Redundant Power Supply Specifications

Table A-2 lists the technical specifications for the Cisco RPS 300 (model PWR300-AC-RPS-N1).

Table A-2   Technical Specifications for the Cisco RPS 300

Item	Specification
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)
Storage humidity	5 to 95% (noncondensing)
Operating altitude	Up to 10,000 ft (3,000 m)
Storage altitude	Up to 15,000 ft (4,570 m)
Power Requirements	
AC input voltage	85 to 264 VAC 50 to 60 Hz
Power consumption: Total Per channel	144W per 48 VDC output and 156W per 12 VDC output Maximum for both outputs: 300W, continuous 150W per channel maximum
Physical Dimensions	
Weight	10.5 lb (4.7 kg)
Dimensions (H x W x D)	1.75 x 17.5 x 12 in. (4.45 x 44.45 x 30.48 cm)

■ **Redundant Power Supply Specifications**

Connector and Cable Specifications

This section describes the Catalyst 4224 Access Gateway Switch ports and the cables and adapters used to connect the switch to other devices.

This section includes the following topics:

- Console Connector Pinouts, page B-1
- Management Port Pinouts, page B-2
- Eight-Port RJ21 FXS Module Connector Pinouts, page B-3
- Cable and Adapter Specifications, page B-4

Console Connector Pinouts

Table B-1 lists the console connector pinouts.

Table B-1   Console Serial Port Pinouts—RJ-45

Pin	Signal	Direction	Description
1	RTS	output	Request to send
2	DTR	output	Data terminal ready
3	TXD	output	Transmit data
4	Ground		
5	Ground		
6	RXD	input	Receive data

Table B-1   Console Serial Port Pinouts—RJ-45 (continued)

Pin	Signal	Direction	Description
7	DSR	input	Data set ready
8	CTS	input	Clear to send

Management Port Pinouts

Table B-2 lists the management port pinouts.

Table B-2   Management Port Pinouts—RJ-45

Pin	Signal	Direction	Description
1	RXD+	input	Receive data diff[1] pair
2	RXD-	input	Receive data diff pair
3	TXD+	output	Transmit data diff pair
4	Ground		Unused pair
5	Ground		Unused pair
6	TXD-	output	Transmit data diff pair
7			Unused pair
8			Unused pair

1. Differential. There exists a positive and negative copy of the signal with a set impedance.

Eight-Port RJ21 FXS Module Connector Pinouts

Table B-3 lists the port and pin numbers on the RJ-21 pinout for the eight-port FXS module connector.

Table B-3   RJ-21 Pinout for the Eight-Port RJ21 FXS Module Connector

Port Number	Connector Pin Number	Signal
0	0 25	Ring Tip
1	1 26	Ring Tip
2	2 27	Ring Tip
3	3 28	Ring Tip
4	4 29	Ring Tip
5	5 30	Ring Tip
6	6 31	Ring Tip
7	7 32	Ring Tip
8 - 15	8 - 15 33 - 40	Not Used
16 - 24	16 - 24 41 - 49	GND

Cable and Adapter Specifications

This section contains the following topics:

Crossover and Straight-Through Cable Pinouts

The schematics of crossover and straight-through cables are shown in Figure B-1 and Figure B-2.

Figure B-1   Crossover Cable Schematic

```
Switch              Switch

3 TD+         ┐  ┌  3 TD+
6 TD–         ┘  └  6 TD–
               X
1 RD+   ◄─┘  └─►  1 RD+          H5579
2 RD–   ◄──    ──►  2 RD–
```
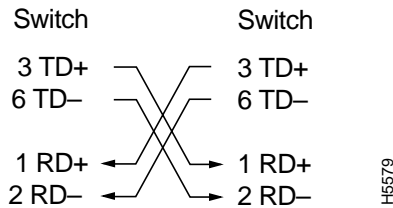
Figure B-2   Straight-Through Cable Schematic

```
Switch              Switch

3 TD+   ──────►  3 RD+
6 TD–   ──────►  6 RD–

1 RD+   ◄──────  1 TD+          H5578
2 RD–   ◄──────  2 TD–
```
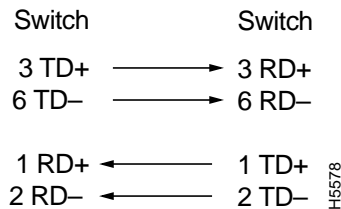
Rollover Cable and Adapter Pinouts

This section contains the following topics:

Identifying a Rollover Cable

To identify a rollover cable, compare the two modular ends of the cable. 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-3).

Figure B-3   Identifying a Rollover Cable

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

Pin 1

Pin 8

H10632
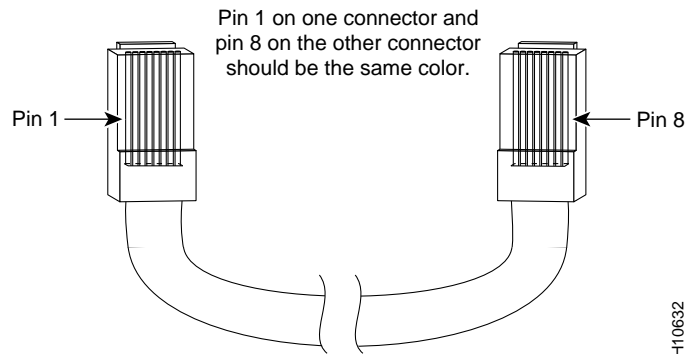
Connecting to a PC

Use the supplied thin, flat, RJ-45-to-RJ-45 rollover cable and RJ-45-to-DB-9 female DTE adapter to connect the console port to a PC running terminal-emulation software. Table B-4 lists the pinouts for the console port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-9 female DTE adapter.

Table B-4   Console Port Signaling and Cabling Using a DB-9 Adapter

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

Connecting to a Terminal

Use the thin, flat, RJ-45-to-RJ-45 rollover cable and RJ-45-to-DB-25 female DTE adapter to connect the console port to a terminal. Table B-5 lists the pinouts for the console port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-25 female DTE adapter.

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=) containing this adapter from Cisco.

Table B-5   Console Port Signaling and Cabling Using a DB-25 Adapter

Console Port (DTE)	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-25 Terminal Adapter	Console Device
Signal	RJ-45 Pin	RJ-45 Pin	DB-25 Pin	Signal
RTS	1	8	5	CTS
DTF	2	7	6	DSR
TxD	3	6	3	RxD
GND	4	5	7	GND
GND	5	4	7	GND
RxD	6	3	2	TxD
DTF	7	2	20	DTR
CTS	8	1	4	RTS

Cable and Adapter Specifications

Identifying Hardware Problems with the ROM Monitor

This section describes the ROM monitor bootstrap program, which you can use to identify hardware problems encountered during installation. The ROM monitor runs when you power on or restart the Catalyst 4224 Access Gateway Switch. During normal operation, the ROM monitor helps to initialize the processor hardware and boot the operating system software.

This section includes the following topics:

Entering ROM Monitor Mode

To use the ROM monitor, your terminal or workstation must be connected to the console port of the switch. See the "Connecting a Terminal to the Console Serial and Ethernet Management Ports" section on page 3-10 for information on making this connection.

To enter ROMMON mode, perform the following tasks:

Procedure

Step 1   Enter the **enable** command at the Gateway> prompt to enter privileged mode.

Step 2   Enter the **reload** command at the Gateway# prompt to restart the Catalyst 4224.

Step 3   Press the **Break** key for 60 seconds while the system is starting up. Pressing this key forces the Catalyst 4224 to stop booting and enter the ROMMON mode.

This example shows how to enter ROMMON mode:

```
Gateway>
Gateway> enable
Gateway# reload

System configuration has been modified. Save? [yes/no]:yes
Building configuration...
[OK]
Proceed with reload? [confirm]

16:51:22:%SYS-5-RELOAD:Reload requested
System Bootstrap, Version 12.0(20001221:021337) [ssamiull-gateway_g1
108], DEVELOPMENT SOFTWARE
Copyright (c) 1994-2000 by cisco Systems, Inc.
Compiled Tue 26-Dec-00 17:52 by ssamiull-gateway_g1

Board Rev 0x04, Brazil Rev 0x03, Rio Rev 0x01, Disco Rev 0x01
C4924V platform with 65536 Kbytes of main memory

rommon 1 >
*** This ROMMON prompt will appear provided Autoboot is disabled.

*** The number "1" represents the line number, which increases
*** incrementally at each prompt.

rommon 1 > cont
*** Returns you to IOS.

Gateway#
telnet> send break

*** System received an abort due to Break Key ***
signal= 0x3, code= 0x500, context= 0x817aaa30
PC = 0x802948d0, Vector = 0x500, SP = 0x80006548
rommon 2 >
```

Configuring for Autoboot

You can configure the Catalyst 4224 to enter ROMMON mode automatically upon a reboot by setting virtual configuration register bits 3, 2, 1, and 0 to 0.

To configure automatic reboot, follow these steps:

Procedure

Step 1   Enter the **enable** command at the Gateway> prompt to enter privileged mode.

Step 2   Enter the configuration command **configuration-register 0x0** at the Gateway# prompt.

Step 3   Enter the **reload** command at the Gateway# prompt to restart the Catalyst 4224.

This example shows how to configure for autoboot:

```
Gateway> enable
Gateway# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Gateway(config)# config-register ?
  <0x0-0xFFFF>  Config register number
Gateway(config)# config-register 0
Gateway(config)# end
Gateway#
```

The new configuration register value, 0x0, is effective after the reboot. This means that upon a reboot, the Catalyst 4224 remains in ROMMON mode and does not boot the operating system. To boot the operating system, you must do so from the console.

Refer to the **boot** command in the "General Use Commands" section on page C-5 and the **tftpdnld** command in the "Boot and System Image Recovery Command: tftpdnld" section on page C-16.

ROM Monitor Commands

This section describes the ROM monitor syntax conventions and the most commonly used commands. To display a complete list, enter **?** or **help** at the ROMMON prompt, as follows:

```
rommon 1 >  ?
```

✎

Note   You can terminate any command by pressing the **Break** key at the console.

ROM Monitor Syntax Conventions

The ROM monitor commands use the following conventions:

Convention	Purpose
[ ]	Square brackets [ ] denote an optional element.
-s:	If a minus option is followed by a colon (for example, [-s:]), you must provide an argument for the option.
italics	A term in italics means that you must fill in the appropriate information.

Command Descriptions

This section describes some of the more commonly used ROM monitor commands:

For more information, refer to the Cisco IOS configuration guides and command references.

General Use Commands

This section lists the ROM monitor general-use commands.

boot or b

Enter the **boot** or **b** command to boot the Cisco IOS software image from either Flash memory, TFTP, or boothelper.

boot usage notes are as follows:

- **b** boots the first image (if multiple images exist) in Flash memory.
- **b** *flash*:[*name*] boots the named Cisco IOS software from the Flash memory.
- **b** *filename tftpserver* boots the named Cisco IOS software from the specified TFTP server.

  An example of this command is as follows:

  ```
  boot c4gwy-io3s-mz 172.15.19.11
  ```

- **b** *filename* boots the named Cisco IOS software from the boothelper image. (The boothelper is the downloaded image that downloads the IOS image.) This method of booting is necessary if the device ID is unrecognizable.

> ✎
>
> **Note** If the device does not have an image or if the Flash is corrupt, the device's Flash ID might be lost.

You can override the default setting for the boothelper image by pointing the BOOTLDR monitor environment variable to another image. (Any system image can be used for this purpose.)

boot command options are as follows:

- **-x** downloads the image and puts it into memory, but does not execute.
- **-v** ("verbose") prints detailed information while downloading the image.

To display the running image, enter the **show version** and **show hardware** IOS commands.

dir *device:* [*partition:*]

Enter the **dir device [partition]** command to list the files on the named device. An example of this command is as follows:

```
rommon 8 > dir flash:
      File size              Checksum    File name
      2229799 bytes (0x220627)  0x469e    c4gwy-io3s-mz-j-m2.113-4T
```

meminfo

Enter the **meminfo** command to display the following details of main memory:

- • nbyte size

- • Starting address

- • Available range of main memory

- • Starting point and size of packet memory

- • Size of nonvolatile memory (NVRAM)

An example of this command is as follows:

```
rommon 9 > meminfo

Main memory size: 32 MB.
Available main memory starts at 0xa000e000, size 32704KB
IO (packet) memory size: 25 percent of main memory.
NVRAM size: 256KB
```

meminfo [-I]

Enter the **meminfo[-I]** command to display supported Dual In-Line Memory Module (DIMM) configurations. An example of this command is as follows:

```
rommon 1 > meminfo -l

Supported memory configurations:

DIMM 0
---------
```

priv

Enter the **priv** command to enter privileged ROMMON mode. An example of this command is as follows:

```
rommon 3 > priv
You now have access to the full set of monitor commands.
Warning:some commands will allow you to destroy your
configuration and/or system images and could render
the machine unbootable.
```

reset or i

Enter the **reset** or **i** command to reset and initialize the Catalyst 4224. This command's function is similar to power on.

An example of this command is as follows:

```
rommon 5 > reset

System Bootstrap, Version 12.0(20001221:021337) [ssamiull-gateway_g1
108], DEVELOPMENT SOFTWARE
Copyright (c) 1994-2000 by cisco Systems, Inc.
Compiled Tue 26-Dec-00 17:52 by ssamiull-gateway_g1

Board Rev 0x04, Brazil Rev 0x03, Rio Rev 0x01, Disco Rev 0x01
C4924V platform with 65536 Kbytes of main memory

rommon 1 >
```

version

Enter the **version** command to display the software version of ROMMON. An example of this command is as follows:

```
rommon 1 > version

System Bootstrap, Version 12.0(20001221:021337) [ssamiull-gateway_g1
108], DEVELOPMENT SOFTWARE
Copyright (c) 1994-2000 by cisco Systems, Inc.
Compiled Tue 26-Dec-00 17:52 by ssamiull-gateway_g1

Board Rev 0x04, Brazil Rev 0x03, Rio Rev 0x01, Disco Rev 0x01
rommon 2 >
```

Debugging Commands

This section lists the ROM monitor debugging commands.

Most debugging commands are functional only when IOS software has crashed or is aborted. If you enter a debugging command and IOS crash information is unavailable, this error message is displayed:

```
"xxx: kernel context state is invalid, can not proceed."
```

stack or k

Enter the **stack** command produces a stack trace. An example of this command is as follows:

```
rommon 2 > k
Stack trace:
PC = 0x80266a38
Frame 00:FP = 0x80006560    PC = 0x80266a38
Frame 01:FP = 0x8000656c    PC = 0x80265ac0
Frame 02:FP = 0x8000662c    PC = 0x80262718
Frame 03:FP = 0x8000665c    PC = 0x8002011c
Frame 04:FP = 0x8000666c    PC = 0x80020068
Frame 05:FP = 0x80006684    PC = 0xfff03e7c
Invalid FP = 0x800066bc, cannot proceed
```

context

Enter the **context** command to display processor context. An example of this command is as follows:

```
rommon 5 > context
CPU context of the most recent exception:
PC  = 0x801ca8d0  MSR = 0x00009032  CR  = 0x22000022  LR   =
0x801c61f0
CTR = 0x801ed28c  XER = 0x00000000  DAR = 0xffffffff  DSISR =
0xffffffff
DEC = 0xffffffff  TBU = 0xffffffff  TBL = 0xffffffff  IMMR  =
0xffffffff
R0  = 0x801c61f0  R1  = 0x80006540  R2  = 0xffffffff  R3   =
0x00000000
R4  = 0x00000000  R5  = 0x81858a7c  R6  = 0x00009032  R7   =
0xdeadfeed
R8  = 0x00000000  R9  = 0x00000000  R10 = 0x0000fe8c  R11  =
0x00000000
```

```
R12 = 0x0000003c  R13 = 0xffffffff  R14 = 0xffffffff  R15  =
0xffffffff
R16 = 0xffffffff  R17 = 0xffffffff  R18 = 0xffffffff  R19  =
0xffffffff
R20 = 0xffffffff  R21 = 0xffffffff  R22 = 0xffffffff  R23  =
0xffffffff
R24 = 0xffffffff  R25 = 0xffffffff  R26 = 0xffffffff  R27  =
0xffffffff
R28 = 0xffffffff  R29 = 0xffffffff  R30 = 0xffffffff  R31  =
0xffffffff
rommon 6 >
```

frame

Enter the **frame** command to display an individual stack frame. An example of this command is as follows:

```
rommon 5 > frame 00
Frame 00:FP = 0x80006560    PC = 0x80266a38
at 0x80006568 (fp + 0x08) = 0x817b4280
rommon 6 > frame 01
Frame 01:FP = 0x8000656c    PC = 0x80265ac0
at 0x80006574 (fp + 0x08) = 0x00000000
at 0x80006578 (fp + 0x0c) = 0x80010000
at 0x8000657c (fp + 0x10) = 0xfff30000
at 0x80006580 (fp + 0x14) = 0x80020000
at 0x80006584 (fp + 0x18) = 0x83ff7800
at 0x80006588 (fp + 0x1c) = 0x80020000
at 0x8000658c (fp + 0x20) = 0x8000667c
at 0x80006590 (fp + 0x24) = 0x00000000
at 0x80006594 (fp + 0x28) = 0x81250000
at 0x80006598 (fp + 0x2c) = 0x00000001
rommon 7 > frame 03
Frame 03:FP = 0x8000665c    PC = 0x8002011c
at 0x80006664 (fp + 0x08) = 0x0122ed84
at 0x80006668 (fp + 0x0c) = 0x83ff7800
rommon 8 > frame 04
Frame 04:FP = 0x8000666c    PC = 0x80020068
at 0x80006674 (fp + 0x08) = 0x00000002
at 0x80006678 (fp + 0x0c) = 0x00000000
at 0x8000667c (fp + 0x10) = 0x0122ed84
at 0x80006680 (fp + 0x14) = 0x83ff7800
rommon 9 > frame 05
Frame 05:FP = 0x80006684    PC = 0xfff03e7c
at 0x8000668c (fp + 0x08) = 0x00000005
at 0x80006690 (fp + 0x0c) = 0x800046ac
at 0x80006694 (fp + 0x10) = 0xfff24c90
```

```
at 0x80006698 (fp + 0x14) = 0x00000000
at 0x8000669c (fp + 0x18) = 0x00000000
at 0x800066a0 (fp + 0x1c) = 0x00000000
at 0x800066a4 (fp + 0x20) = 0x00000000
at 0x800066a8 (fp + 0x24) = 0x00000000
at 0x800066ac (fp + 0x28) = 0x00000000
at 0x800066b0 (fp + 0x2c) = 0x00000000
rommon 10 >
```

sysret

Enter the **sysret** command to display return information from the last booted system image. This information includes the reason for terminating the image, a stack dump of up to eight frames, and, if an exception is involved, the address where the exception occurred. An example of this command is as follows:

```
rommon 8 > sysret
System Return Info:
count: 19,  reason: a SegV exception
pc:0x802b1040,  error address: 0x802b1040
Stack Trace:
FP: 0x80908398, PC: 0x802b102c
FP: 0x809083b0, PC: 0x802b0b88
FP: 0x809083d8, PC: 0x8017039c
FP: 0x809083e8, PC: 0x8016f764
```

Cookie Commands

This section lists the ROM **cookie** and **fxs_high_density cookie** commands.

cookie

Enter the **cookie** command to display identification information for the Catalyst 4224.

In nonprivileged mode, the **cookie** command displays read-only information for a Catalyst 4224.

An example of this command is as follows:

```
rommon 2 > cookie
cookie:
01 01 00 10 7b fb 1a 36 53 00 00 00 01 7a 00 06
00 00 00 00 00 00 00 00 4a 41 42 04 44 30 44 41
32 01 05 00 00 00 00 00 00 00 00 00 05 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

In privileged mode, the **cookie** command lets you edit the switch information as follows:

```
rommon 3 > priv
You now have access to the full set of monitor commands.
Warning:some commands will allow you to destroy your
configuration and/or system images and could render
the machine unbootable.
rommon 4 > cookie

View/alter bytes of serial cookie by field --
Input hex byte(s) or:CR -> skip field; ? -> list values
Cookie Version Number:01
                    >
Vendor:01

Base MAC Address:00 10 7b fb 1a 36

Processor ID:53

Unused:00 00 00

PA Type:01 7a

MAC Addresses Allocated:00 06

Unused:00 00 00 00

Serial Number:00 00 00 00

PSL Location:4a 41 42

PSL Year:04

PSL Week:44
```

```
PSL Serial:30 44 41 32

Hardware Major Version:01

Hardware Minor Version:05

Deviation:00 00

RMA Failure Code:00

RMA Number:00 00 00

Unused:00 00 00

Board Revision:05

Board Configuration:00

PCA Number:00 00 00 00
rommon 5 >
```

fxs_high_density cookie

Enter the **fxs_high_density** cookie command to display identification information for the Catalyst 4000 8-port RJ21 FXS module.

In nonprivileged mode, the **fxs_high_density cookie** command displays read-only information for an 8-port FXS module.

An example of this command is as follows:

```
rommon 1 > fxs_high_density

fxs_high_density cookie:
ff ff ff ff ff ff ff ff ff ff ff ff 00 02 43 69
73 63 6f 20 53 79 73 74 65 6d 73 20 49 6e 63 00
00 00 57 53 2d 55 34 36 30 34 2d 31 36 00 00 00
00 00 00 00 00 00 59 4f 55 52 43 4f 4e 43 45 52
54 4f 00 00 00 00 00 00 00 37 33 2d 36 34 37
36 2d 30 32 00 00 00 00 00 00 ff ff ff ff 4e 6f
6e 65 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 ff ff ff ff ff ff ff ff ff ff ff ff ff ff
ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
```

```
ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
rommon 2 >
```

In privileged mode, the **fxs_high_density cookie** command allows you to edit the module information as follows:

```
rommon 2 > priv
You now have access to the full set of monitor commands.
Warning:some commands will allow you to destroy your
configuration and/or system images and could render
the machine unbootable.
rommon 3 > fxs_high_density

View/alter bytes of fxs_high_density serial cookie by field --
Input hex byte(s) or:CR -> skip field; ? -> list values
block_signature:ff ff

block_version:ff

block_length:ff

block_checksum:ff ff

seeprom_size:ff ff

block_count:ff ff

fru_major_type:ff ff

fru_minor_type:00 02

OEM_string:Cisco Systems Inc

product_number:WS-U4604-16

serial_number:YOURfxs_high_density

part_number:73-6476-02

part_revision:ff ff ff ff

mfg_deviation:None

hw_rev_major:ff ff

hw_rev_minor:ff ff
```

```
mfg_bits:ff ff

eng_bits:ff ff

snmpIOD:ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff

power_consumption:ff ff

RMA failure code:ff ff ff ff
rommon 4 >
```

Configuration Register Command

This section describes the ROM **confreg** command.

confreg

Enter the **confreg** command to display the contents of the virtual configuration register.

After entering the command, you will see a prompt asking you to alter the contents as follows:

```
rommon 7 > confreg

    Configuration Summary
enabled are:
break/abort has effect
console baud: 9600
boot: the ROM Monitor

do you wish to change the configuration? y/n  [n]:  y
enable  "diagnostic mode"? y/n  [n]:  y
enable  "use net in IP bcast address"? y/n  [n]:
enable  "load rom after netboot fails"? y/n  [n]:
enable  "use all zero broadcast"? y/n  [n]:
disable "break/abort has effect"? y/n  [n]:
enable  "ignore system config info"? y/n  [n]:
change console baud rate? y/n  [n]:  y
enter rate: 0 = 9600,  1 = 4800,  2 = 1200,  3 = 2400
            4 = 19200, 5 = 38400, 6 = 57600, 7 = 115200  [0]:  0
change the boot characteristics? y/n  [n]:  y
enter to boot:
 0 = ROM Monitor
 1 = the boot helper image
```

```
 2-15 = boot system
    [0]:  0

    Configuration Summary
enabled are:
diagnostic mode
break/abort has effect
console baud: 9600
boot: the ROM Monitor

do you wish to change the configuration? y/n  [n]:

You must reset or power cycle for new config to take effect
```

confreg [*hexnum*]

Enter the **confreg [hexnum]** command to change the virtual configuration register to the value specified. The value is always interpreted as hexadecimal.

Modifying the Configuration Register from the Operating System Software

The virtual configuration register resides in NVRAM. You can display or modify the register from either the ROM monitor or the operating system software. When you change the register, the new value is written into NVRAM, but is not effective until you reset or power-cycle the Catalyst 4224.

To modify the configuration register from the operating system software, enter the following commands:

```
Gateway> enble
Gateway# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Gateway(config)# config-register 0x0
Gateway(config)# end
Gateway#
```

Boot and System Image Recovery Command: tftpdnld

If your Catalyst 4224 will not boot, the Cisco IOS software image in Flash memory might be corrupt. If so, you can obtain a new one with the **tftpdnld** ROM monitor commands.

Enter the **tftpdnld** command to download a Cisco IOS software image from a remote server into Flash memory using TFTP. (You must have a TFTP server directly connected to the front-panel Ethernet management port.) Monitor variables are used to set up parameters for the transfer.

Usage: **tftpdnld [-rxe]**

✎
Note   In nonprivileged mode, only the **-r** command line option is available.

The syntax for specifying variables is as follows:

```
VARIABLE_NAME=value
```

The following variables are required:

- IP_ADDRESS—The IP address for the Catalyst 4224 you are using.

- IP_SUBNET_MASK—The subnet mask for the Catalyst 4224 you are using.

- DEFAULT_GATEWAY—The default gateway for the Catalyst 4224 you are using.

- TFTP_SERVER—The IP address of the server from which you want to download the image file.

- TFTP_FILE—The name of the file that you want to download.

The following variables are optional:

- TFTP_VERBOSE—Print setting. 0=quiet, 1=progress, 2=verbose. The default is 1.

- TFTP_RETRY_COUNT—Retry count for ARP and TFTP. The default is 7.

- TFTP_TIMEOUT—Overall timeout of the download operation in seconds. The default is 2400 seconds.

- TFTP_CHECKSUM—Performs a checksum test on the image. 0=no, 1=yes. The default is 1.

- FE_SPEED_MODE—0=10/hdx, 1=10/fdx, 2=100/hdx, 3=100/fdx, 4=Auto(deflt)

Command line options are as follows:

- **-r**: does not write to Flash memory, loads to DRAM only and launches image.

- **-x**: does not write to Flash memory, loads to DRAM only and does not launch image.

- **-e**: does not erase Flash memory before writing image to the Flash memory.

After you specify the variables, you must reenter the **tftpdnld** command as follows:

```
rommon 1 > tftpdnld
rommon 2 > IP_ADDRESS=172.15.19.11
rommon 3 > IP_SUBNET_MASK=255.255.255.0
rommon 4 > DEFAULT_GATEWAY=172.15.19.1
rommon 5 > TFTP_SERVER=172.15.20.10
rommon 6 > TFTP_FILE=/tftpboot/c4gwy-io3s-mz
rommon 7 > TFTP_VERBOSE=1
rommon 8 > tftpdnld

IP_ADDRESS=172.15.19.11
IP_SUBNET_MASK=255.255.255.0
DEFAULT_GATEWAY=172.15.19.1
TFTP_SERVER=172.15.20.10
TFTP_FILE=/tftpboot/c4gwy-io3s-mz
TFTP_VERBOSE=1

Invoke this command for disaster recovery only.
WARNING: all existing data in flash will be lost!
Do you wish to continue? y/n: [n]:
```

Enter **y** to begin downloading the Cisco IOS software image. When this process completes, the ROMMON prompt displays on your screen.

To terminate **tftpdnld**, press **Break** or **Ctrl-C**.

Upgrading the ROM Monitor

There are two ways to upgrade the ROM monitor:

Upgrading the ROM Monitor from Cisco IOS CLI

To upgrade the ROM monitor, enter this Cisco IOS command in privileged mode:

```
chopin# upgrade rommon tftp://171.69.1.129/c4gwy_rommon.srec
```

This command downloads the new ROM monitor image from a TFTP server and then overwrites the previous image in Flash memory.

Upgrading the ROM Monitor from ROMMON

To upgrade the ROM monitor, follow these steps:

Procedure

Step 1   Enter the following at the ROMMON prompt:

```
IP_ADDRESS=172.20.59.55
IP_SUBNET_MASK=255.255.255.0
DEFAULT_GATEWAY=172.20.59.1
TFTP_SERVER=171.69.1.129
TFTP_FILE=chopin/c4gwy-rommon-mz
```

Step 2   Enter **sync** to save the variables to NVRAM.

Step 3   Enter **tftpdnld -r** to boot theCisco IOS image from the network.

> ✎
>
> **Note**   You can boot the c4gwy-rommon-mz image or boot the Cisco IOS image from Flash memory if present.

Repacking the Catalyst 4224 Access Gateway Switch

If you need to return or move the Catalyst 4224, follow these steps to repack the Catalyst 4224 using the original packaging material:

Procedure

Step 1 Slide the pieces of the packing foam over the switch.

Step 2 Place the documentation and accessory kit in the box or plastic bag provided.

Step 3 Place the box or plastic bag containing the documentation and accessory kit on top of the packing material.

Step 4 Place the switch (with packing foam pieces) into the packing carton (see Figure D-1).

Step 5 Fold in the top flaps of the packing carton and seal with packing tape.

Figure D-1   Repacking the Catalyst 4224 Access Gateway Switch

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