



Product Overview

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

- [Switch Features, page 1-1](#)
- [Switch Components, page 1-4](#)
- [Supported Interface Cards, page 1-11](#)



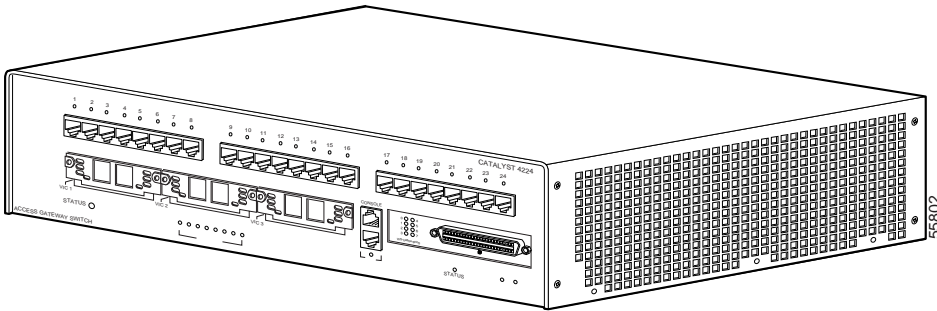
Note

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 1-6](#).

[Table 1-1](#) describes the Catalyst 4224 features.

Table 1-1 Catalyst 4224 Access Gateway Switch Features

Feature	Description
Ethernet speeds	<ul style="list-style-type: none"><li data-bbox="650 313 1228 370">• Ethernet (10BaseT) interface to workstations and repeaters<li data-bbox="650 386 1170 443">• Fast Ethernet (100BaseT) interface to workstations, servers, switches, and routers <p data-bbox="637 464 1193 553">Note Auto-negotiation of link speed on each 10/100 port allows migration to 100BaseT from a 10BaseT installed base.</p>
Standard management and support	<ul style="list-style-type: none"><li data-bbox="650 573 1228 630">• Layer 2 forwarding and filtering at full wire speed on each port<li data-bbox="650 646 1083 675">• 16,000 MAC¹ addresses per system<li data-bbox="650 691 1210 748">• Up to 1,024 VLANs with IEEE 802.1Q VLAN tagging on all ports and support for VTP²

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

Feature	Description
Software management	<ul style="list-style-type: none"> • CLI³ and SNMP⁴ 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 <p>Note The Catalyst 4224 has a 10/100BaseT management port.</p> <ul style="list-style-type: none"> • RMON⁵ with RMON 1 • Standard Layer 2 elements: <ul style="list-style-type: none"> – 802.1D Spanning Tree – CDP⁶ – VTP version 2 with pruning extensions – CGMP⁷ client
Embedded management	<ul style="list-style-type: none"> • 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 <i>sniff</i> port (any switching port can be designated as a <i>sniff</i> port) • Performance management information

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

Feature	Description
Encryption support	<ul style="list-style-type: none">• 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 IKE⁸ SA setups per second
Power supplies	<ul style="list-style-type: none">• 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

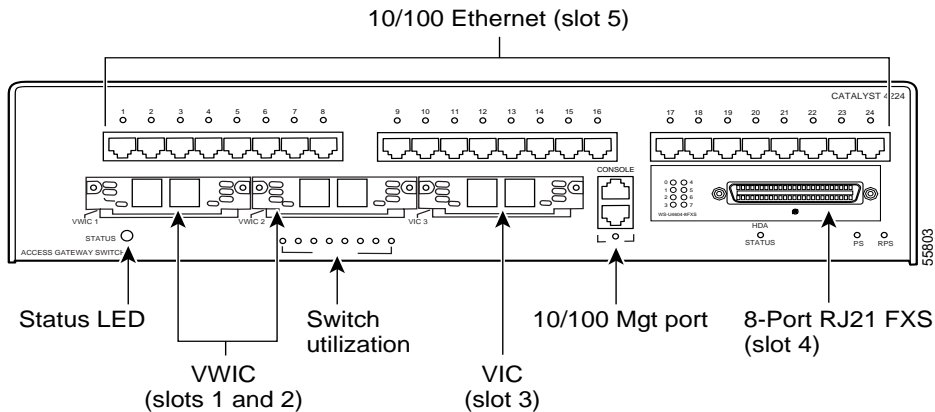
This section describes the Catalyst 4224 components:

- [Front Panel, page 1-5](#)
- [Management Ports, page 1-5](#)
- [Slots, page 1-6](#)
- [Front Panel LEDs, page 1-8](#)
- [Fan Assembly, page 1-9](#)
- [Power Supplies, page 1-10](#)

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	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.

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

LED	Color	Description
	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.
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.

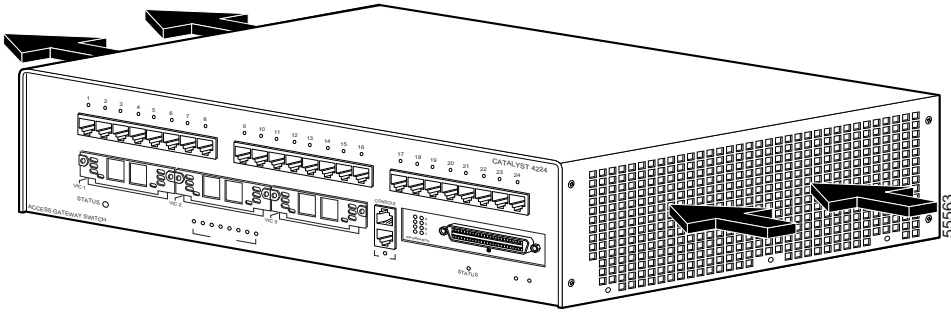


Note

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

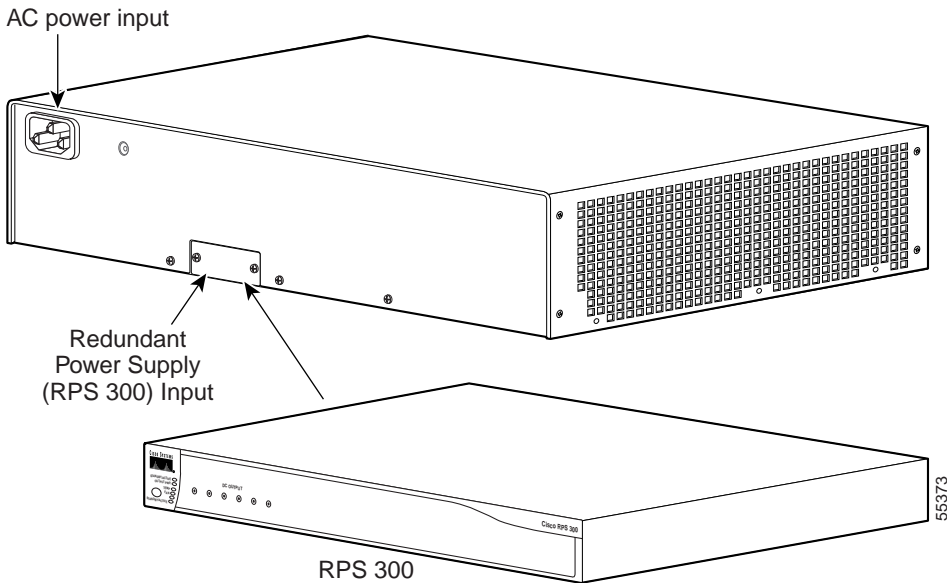


If an individual fan fails, the other fans continue to run. Sensors monitor the internal air temperatures. If the air temperature exceeds a tolerable threshold, the environmental monitor displays warning messages.

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 1-15](#)
- [T1/E1 Multiflex Voice/WAN Interface Cards, page 1-18](#)

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:

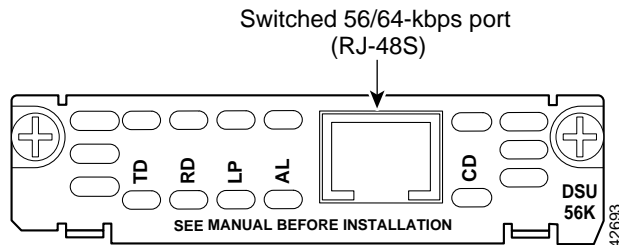
- [One-Port 56/64-kbps DSU/CSU Card, page 1-12](#)
- [One-Port T1/FT1 DSU/CSU Card, page 1-13](#)
- [Two-Port Asynchronous/Synchronous Serial Card, page 1-13](#)
- [One-Port and Two-Port Serial Cards, page 1-14](#)

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.

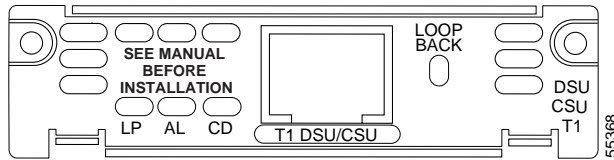
Figure 1-5 WIC-1DSU-56K—Front Panel View



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

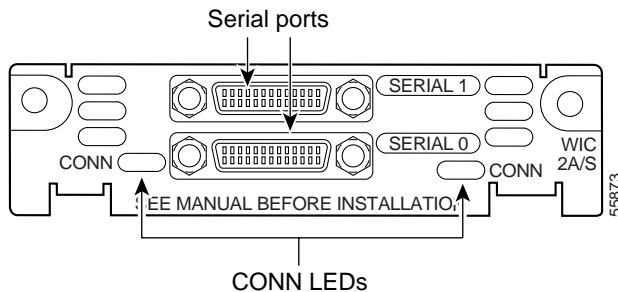
The two-port asynchronous/synchronous (A/S) serial card (see [Figure 1-7](#)) provides an EIA/TIA-232, EIA/TIA-449, V.35, X.21, Data Terminating Equipment/Data Communication Equipment (DTE/DCE), EIA-530, or EIA-530A serial interface to a Catalyst 4224.



Note

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

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

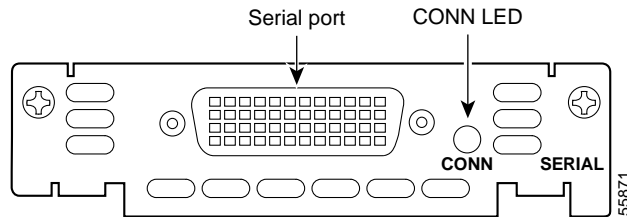
Figure 1-7 WIC-2A/S—Front Panel View

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.

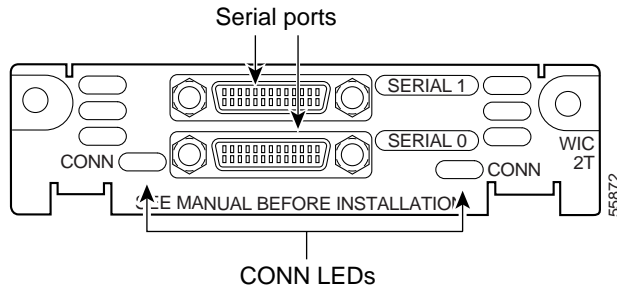
The Catalyst 4224 supports the one-port WIC-1T serial card (see [Figure 1-8](#)). The WIC-1T supports these electrical interfaces when used with the appropriate transition cable: V.32, RS-232, RS-449, RS-530, and RS-530A in male and female versions for both DCE and DTE devices.

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

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, page 1-16](#)
- [Eight-Port FXS RJ21 Analog Interface Card, page 1-16](#)
- [Two-Port FXO Analog Interface Card, page 1-17](#)
- [Two-Port ISDN BRI Card, page 1-17](#)

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.

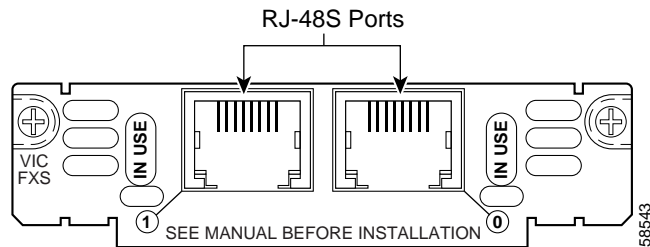


Note

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

The Catalyst 4224 supports the VIC-2FXS card.

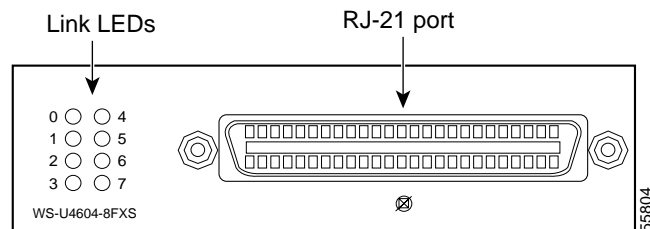
Figure 1-10 VIC-2FXS—Front Panel View



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.



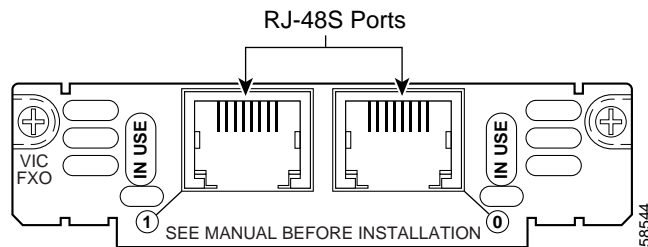
Note

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

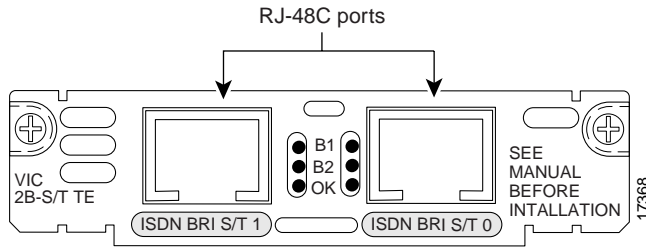


Two-Port ISDN BRI Card

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:

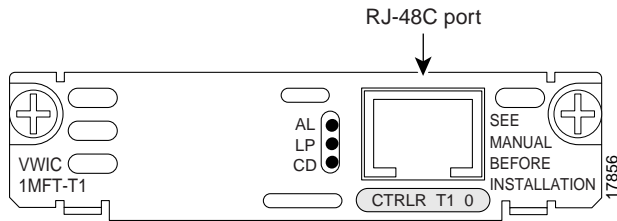
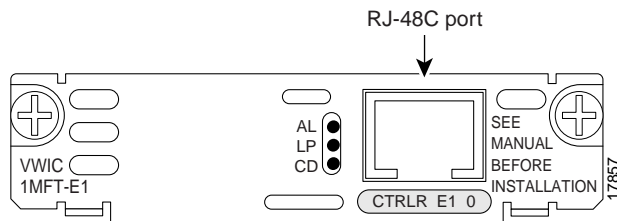
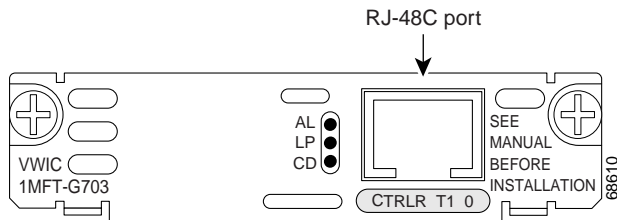
- [One-Port Multiflex Trunk Interface Cards, page 1-18](#)
- [Two-Port Multiflex Trunk Interface Cards, page 1-19](#)

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 *VVIC-1MFT-T1—Front Panel View***Figure 1-15** *VVIC-1MFT-E1—Front Panel View***Figure 1-16** *VVIC-1MFT-G703—Front Panel View*

Two-Port Multiflex Trunk Interface Cards

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

- VVIC-2MFT-T1 (see [Figure 1-17](#))
- VVIC-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. Moreover, 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

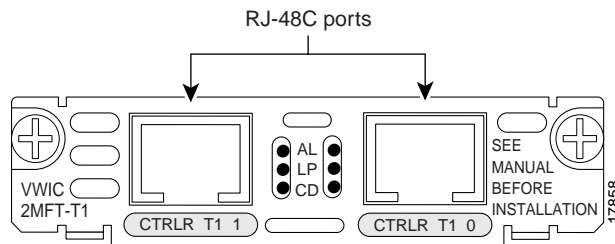


Figure 1-18 VWIC-2MFT-E1—Front Panel View

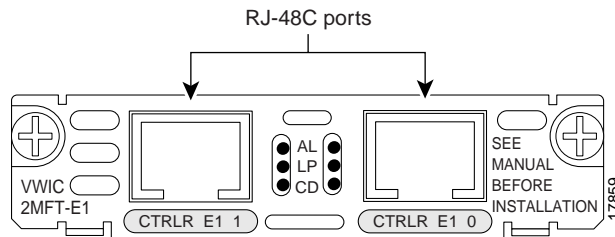
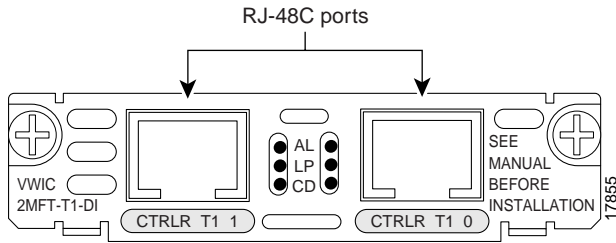
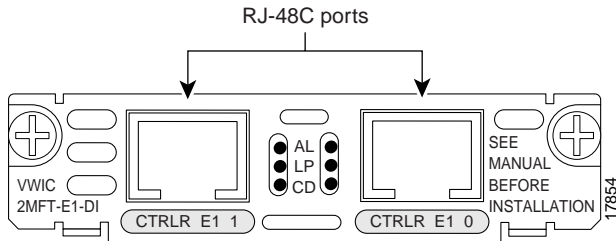


Figure 1-19 *VVIC-2MFT-T1-DI—Front Panel View***Figure 1-20** *VVIC-2MFT-E1-DI—Front Panel View***Figure 1-21** *VVIC-2MFT-G703—Front Panel View*