Cisco Catalyst 4500 Series Line Cards

High Performance, Mobile, and Secure User Experience

Product Benefits

The Cisco® Catalyst® 4500 Series Switches enable borderless networks, providing high performance, mobile, and secure user experiences through Layer 2-4 switching. Enabling security, mobility, application performance, video, and energy savings over your network infrastructure, the Cisco Catalyst 4500 supports resiliency, virtualization, and automation, further improving the ease of network use. Cisco Catalyst 4500 Series Switches provide borderless performance, scalability, and services with reduced total cost of ownership and superior investment protection.

The Cisco Catalyst 4500 delivers predictable and scalable high performance, with advanced dynamic quality of service (QoS) capabilities and configuration flexibility for deploying borderless networks. Integrated resiliency features in both hardware and software maximize network availability, helping to ensure workforce productivity, profitability, and customer success. Its centralized, innovative, and flexible system design helps ensure smooth migration to wire-speed IPv6 and 10 Gigabit Ethernet (GE). The forward and backward compatibility between generations of the Cisco Catalyst 4500 Series extends deployment life, providing exceptional investment protection, while reducing the total cost of ownership.

The Cisco Catalyst 4500E Series is a high-performance next-generation extension to the Cisco Catalyst 4500 Series. The new E-Series is composed of the Cisco Catalyst 4500E Series Supervisor engines, E-Series line cards, and E-Series chassis, which are designed for a high-performance, mobile, and secure user experience with superior backward and forward compatibility, delivering exceptional investment protection for organizations of all sizes.

Cisco Catalyst 4500E Series and Classic Line Cards

The Cisco Catalyst 4500 Series offers two classes of line cards: classic and E-Series. Classic line cards provide 6 gigabits of switching capacity per slot. E-Series line cards provide increased switching capacity per slot. This increase in per-slot switching capacity with the E-Series line cards requires the Cisco Catalyst 4500E Series chassis and the Cisco Catalyst 4500E Series Supervisor. There are two types of E-Series line cards based on the per-slot switching capacity. E-Series line cards numbered 47xx operate at 48 gigabits per slot, while E-Series line cards numbered 46xx operate at 24 gigabits per slot. Classic line cards may be deployed in both classic and E-Series chassis with either classic Cisco Catalyst 4500 Series supervisor engines or with the Cisco Catalyst 4500E Series Supervisor Engine. With the E-Series supervisor engine, the per-slot switching capacity for classic line cards remains at 6 gigabits per slot. However, because of the centralized switching architecture of the Cisco Catalyst 4500, the classic line cards will adopt all of the new E-Series supervisor engine features such as eight queues per port, dynamic QoS, and hardware-based IPv6 routing. For more feature details, refer to the E-Series supervisor engine data sheet. Classic line cards and E-Series line cards may be mixed and matched within a Cisco Catalyst 4500E Series chassis with no performance degradation: classic line cards will operate at 6 gigabits per slot, and E-Series line cards operate at either 48 gigabits per slot or 24 gigabits per slot based on whether they belong to the 47xx or 46xx family of line cards. Table 1 summarizes the chassis and supervisor support for both classic and E-Series line cards.

Table 1. Cisco Catalyst 4500 Line-Card Support Options

Line-Card Type	Per-Slot Bandwidth	Chassis Support	Supervisor Support
Cisco Catalyst 4500 47xx E-Series Line Cards	48 Gbps	Cisco Catalyst 4503-E, 4506-E, 4507R+E, and 4510R+E	Supervisor Engine 7-E
WS-X4748-RJ45V+E[1]	24 Gbps	Cisco Catalyst 4507R-E and 4510R-E	Supervisor Engine 7-E
Cisco Catalyst 4500 46xx E-Series Line Cards	24 Gbps	Cisco Catalyst 4503-E, 4506-E, 4507R-E, 4507R+E, 4510R-E, and 4510R+E[2]	Supervisor Engine 7-E, Supervisor Engine 6-E, Supervisor Engine 6L-E
Cisco Catalyst 4500 Series Classic Line Cards	6 Gbps	Cisco Catalyst 4503, 4506, 4507R, and 4510R Switches Cisco Catalyst 4503-E, 4506-E, 4507R-E, 4507R+E, 4510R-E, and 4510R+E Switches	Supervisor Engine 7-E[3], Supervisor Engine 6-E, Supervisor Engine 6L-E[3], Supervisor Engine V-10GE

Power over Ethernet on Cisco Catalyst 4500E

The Cisco Catalyst 4500E Series offers line cards, power supplies, and accessories required to deploy and operate standards-based Power over Ethernet/Power over Ethernet Plus (PoE/PoEP). PoE provides power over 100m of standard Category 3/5 unshielded twisted-pair (UTP) cables when an IEEE 802.3af/at-compliant or Cisco prestandard powered device is attached to the PoE/PoEP line-card port. Instead of requiring wall power, attached devices such as IP phones, wireless base stations, video cameras, and other IEEE-compliant appliances can use power provided from the Cisco Catalyst 4500 Series PoE/PoEP line cards. This capability gives network administrators centralized control over power and eliminates the need to install outlets in ceilings and other out-of-the-way places where a powered device can be installed.

Although all references to “PoE/PoEP,” “inline power,” and “voice” power supplies and line cards are synonymous, there are currently only three versions: Cisco prestandard, IEEE 802.3af compliant, and IEEE 802.3at compliant. Every Cisco Catalyst 4500 Series chassis and PoE power supply supports the IEEE 802.3af/at standard and the Cisco prestandard power implementation, helping ensure backward compatibility with existing devices powered by Cisco. All IEEE 802.3af/at-compliant line cards can distinguish an IEEE or Cisco prestandard powered device from an unpowered network interface card (NIC), helping ensure power is applied only when an appropriate device is connected.

Cisco Catalyst 4500E Series and Classic Gigabit Ethernet Copper Line Cards

The Cisco Catalyst 4500E Series 48-port Gigabit Ethernet line cards provide high-performance 10/100/1000 switching. There are two types of E-Series line cards based on the per-slot bandwidth: 47xx line cards that drive 48 Gbps per slot and 46xx line cards that drive 24 Gbps per slot. The Cisco Catalyst 4500 48-port 10/100/1000 E-Series 47xx line card provides standard IEEE 802.3at PoEP support on all 48 ports simultaneously. This line card also supports standard IEEE 802.1AE encryption and Cisco TrustSec™ in hardware. The Cisco Catalyst 4500 48-port 10/100/1000 E-Series 46xx line cards are available in three versions:

- Data only (no PoE)
- Standard IEEE 802.3af PoE
- Standard IEEE 802.3at PoEP

Similarly, classic Gigabit Ethernet copper line cards are also available in three versions:

- Data only (no PoE)
- Standard IEEE 802.3af PoE

[1] WS-X4712-SFP+E is not supported on 4507R-E and 4510R-E chassis.
[2] Slots 8-10 on 4510R-E and 4510R+E chassis do not support E-Series line cards with Supervisor Engine 6-E.
[3] Supervisor Engine 7-E does not support non-E-Series chassis: 4503, 4506, 4507R, and 4510R.

- Standard IEEE 802.3at PoEP

Cisco Catalyst 4500 Classic Fast Ethernet Copper Line Cards

The Cisco Catalyst 4500 Series offers a variety of classic Fast Ethernet line cards with copper interfaces optimized for desktops and servers for enterprise and commercial switching solutions. There are two varieties of fast Ethernet copper line cards:

- Data only (no PoE)
- Standard IEEE 802.3af PoE

Cisco Catalyst 4500E Series 10 Gigabit Ethernet Fiber Line Cards

The Cisco Catalyst 4500E Series supports 10 Gigabit Ethernet Fiber line cards.

The Cisco Catalyst 4500 12-port E-Series 10 Gigabit Ethernet line card (2.5:1 oversubscribed) can be deployed for high-performance and high-density 10 Gigabit Ethernet aggregation in the campus and in small to medium-sized networks as a core switch. The Cisco Catalyst 4500E Series 12-port 10 Gigabit Ethernet line card supports standard Small Form-Factor Pluggable Plus (SFP+) optics. The ports can be used interchangeably as Gigabit Ethernet and 10 Gigabit Ethernet to support phased migration from Gigabit Ethernet to 10 Gigabit Ethernet.

The Cisco Catalyst 4500E Series 6-port 10 Gigabit Ethernet line card (2.5:1 oversubscribed) can be deployed for high-performance/low-density 10 Gigabit Ethernet aggregation in the campus, in small to medium-sized networks as a core switch, or for high-performance wiring closets where additional 10 Gigabit Ethernet uplinks are required. The Cisco Catalyst 4500E Series 6-port 10 Gigabit Ethernet line card supports standard X2 optics as well as the Cisco TwinGig modules. The Cisco TwinGig Converter Module converts a single 10 Gigabit Ethernet X2 interface into two Gigabit Ethernet port slots, which can be populated with appropriate SFP optics, providing a total of 12 wire-speed Gigabit Ethernet ports if used in all six X2 interface slots. The flexibility provided by the TwinGig Converter Module enables customers to aggregate Gigabit Ethernet and 10 Gigabit Ethernet LAN access switches on a single line card and also supports phased migration from Gigabit Ethernet to 10 Gigabit Ethernet. This capability further demonstrates the flexibility and the investment protection of the Cisco Catalyst 4500 Series architecture (Figure 1).

TwinGig modules convert a single X2 port into two Gigabit Ethernet SFP ports.

Figure 1. TwinGig Module

Cisco Catalyst 4500E Series Gigabit Ethernet Fiber Line Cards

The Cisco Catalyst 4500E Series 24-port Gigabit Ethernet fiber line card (SFP based) and Cisco Catalyst 4500E Series 12-port Gigabit Ethernet fiber line card (SFP based) provide high-performance switching at 24 Gbps per slot (line rate). Both E-Series line cards are nonblocking and designed for high-performance 1 Gigabit Ethernet aggregation in the campus and to support Fiber to the Desktop (FTTD) applications.

Cisco Catalyst 4500 Classic Fast Ethernet Fiber Line Cards

The Cisco Catalyst 4500 Series offers a variety of classic Fast Ethernet line cards with fiber interfaces optimized for desktops, branch office backbones, and servers for enterprise and commercial switching solutions and service provider metropolitan Ethernet networks. Fast Ethernet line cards include various densities of wire-speed 10/100, 100-FX, 100BASE-LX10, and 100BASE-BX-D options.

Features and Benefits

Functional Transparency

Cisco Catalyst 4500 Series Switches offers an extensive line of modules that support numerous speeds and physical media combinations. These line cards are functionally transparent; all the packet processing, queuing, buffering, and QoS occur in the supervisor engine. To that end, both classic and E-Series line cards acquire the features and capabilities of the installed supervisor engine. For example, a classic line card previously deployed with a classic supervisor engine using 4 queues per port will automatically have capability for 8 queues per port if redeployed with a Supervisor Engine 7-E/6-E. This architecture enables customers to easily upgrade all Ethernet line cards on their Cisco Catalyst 4500 Series systems to higher layer switching functions by adding a new supervisor engine. The simple design of the line cards results in a very high mean time between failures (MTBF), helping ensure high availability for a single connection to an end user.

Modular Versatility

The Cisco Catalyst 4500 Series is a centralized architecture that is designed to provide dedicated wire-speed bandwidth to each line-card slot within the chassis. Each line card has a dedicated bandwidth to the supervisor engine for packet processing. All network data that flows into the Cisco Catalyst 4500 Series through the various line cards goes through the supervisor engine for processing, even in single-slot port-to-port communications. All line cards have some per-slot bandwidth that allows network administrators to design a system that offers full dedicated bandwidth-to-server and switch-to-switch applications and still provides high performance over subscribed gigabit to the desktop.

A modular centralized design allows customers to use their investment in high-performance line cards across the entire line of Cisco Catalyst 4500 Series chassis and supervisor engines. For example, line cards that shipped with the original Cisco Catalyst 4003 Switch in 1999 will work in the Cisco Catalyst 4500E Series chassis. Because of the centralized architecture of the Cisco Catalyst 4500, all line cards deployed in a chassis benefit from the enhanced features the supervisor engine provides, including QoS, Layer 2/3/4 routing, and hardware-based IPv6.

Following are descriptions of line cards that are available for Cisco Catalyst 4500 Series Switches.

Cisco Catalyst 4500E Series 10 Gigabit Ethernet Fiber Line Card

Figure 2 shows the WS-X4712-SFP+E.

Figure 2. WS-X4712-SFP+E Cisco Catalyst 4500E Series 12-Port 10 Gigabit Ethernet (SFP+)

WS-X4712-SFP+E:

- 48 gigabits per-slot capacity
- Bandwidth is allocated across four 3-port groups, providing 12 Gbps per port group (2.5:1)
- Up to 12 ports 10GE SFP+ (10GBASE-R) or 12 ports GE SFP (1GBASE-X)

- SFP+ and SFP can be used simultaneously on the same line card without any restrictions
- Cisco IOS XE Release 3.1.0SG or later
- IEEE 802.1AE and Cisco TrustSec capability in hardware
- L2-4 Jumbo Frame support (up to 9216 bytes)
- Enterprise and commercial: designed for high-speed backbone and switch-to-switch applications
- Service provider: 10GE/GE mix aggregation for DSLAM/PON/mobile data backhaul
- WS-X4712-SFP+E is not supported on 4507R-E and 4510R-E chassis

Figure 3 shows the WS-X4606-X2-E.

Figure 3. WS-X4606-X2-E Cisco Catalyst 4500E Series 6-Port 10 Gigabit Ethernet (X2)

WS-X4606-X2-E:

- 24 gigabits per-slot capacity
- 24-gigabit bandwidth is allocated across six 10 Gigabit Ethernet ports (2.5:1)
- 10GBASE-X (X2) and 1GBASE-X (SFP)
- Up to 6 ports 10GE X2 or 12 ports GE SFP using TwinGig Converter Module
- TwinGig modules must be used in groups of three: ports 1-3 or ports 4-6
- Cisco IOS Software Release 12.2(40)SG or later
- L2-4 Jumbo Frame support (up to 9216 bytes)
- Enterprise and commercial: designed for high-speed backbone and switch-to-switch applications
- Service provider: 10GE/GE mix aggregation for DSLAM/PON/mobile data backhaul

Cisco Catalyst 4500E Series Gigabit Ethernet Fiber Line Card

Figure 4 shows the WS-X4624-SFP-E.

Figure 4. WS-X4624-SFP-E

WS-X4624-SFP-E:

- 24-port line-rate SFP line card providing 24 gigabits per-slot capacity (1:1 oversubscribed)
- Cisco IOS Software Release 12.2(44)SG or later
- L2-4 Jumbo Frame support (up to 9216 bytes)
- Inherits Supervisor Engine QoS capability
- Compatible only with E-Series supervisor engines

- Enterprise, mid-market, and commercial core and distribution deployments requiring line-rate capability
- Service provider: GE aggregation for DSLAM/PON/mobile data backhaul

Figure 5 shows the WS-X4612-SFP-E.

Figure 5. WS-X4612-SFP-E

WS-X4612-SFP-E:

- 12 port line-rate SFP line card providing 24 gigabits per-slot capacity (1:1 oversubscribed)
- Cisco IOS Software Release 12.2(54)SG or later
- L2-4 Jumbo Frame support (up to 9216 bytes)
- Inherits Supervisor Engine QoS capability
- Compatible only with E-Series supervisor engines
- Enterprise, mid-market, and commercial core and distribution deployments requiring line-rate capability
- Service provider: GE aggregation for DSLAM/PON/mobile data backhaul

Cisco Catalyst 4500E Series 10/100/1000 Line Cards

Figure 6 shows the WS-X4748-RJ45V+E.

Figure 6. WS-X4748-RJ45V+E Cisco Catalyst 4500E Series 48-Port 802.3af PoE and 802.3at PoEP 10/100/1000 (RJ-45)

WS-X4748-RJ45V+E:

- 48 ports nonblocking
- 10/100/1000 module (RJ-45)
- Cisco IOS XE Release 3.1.0SG or later
- IEEE 802.3af/at and Cisco prestandard PoE, IEEE 802.3x flow control
- IEEE 802.1AE and Cisco TrustSec capability in hardware
- L2-4 Jumbo Frame support (up to 9216 bytes)
- Capable of up to 30W of inline power per port on all ports simultaneously
- Enterprise and commercial: designed to power next-generation IP phones, wireless base stations, video cameras, and other PoE devices
- Campus and branch applications requiring enhanced performance for large file transfers and network backups

Figure 7 shows the WS-X4648-RJ45V+E.

Figure 7. WS-X4648-RJ45V+E Cisco Catalyst 4500E Series 48-Port 802.3af PoE and 802.3at PoEP 10/100/1000 (RJ-45)

WS-X4648-RJ45V+E:

- 24 gigabits per-slot capacity
- 48 ports
- 10/100/1000 module (RJ-45)
- Cisco IOS Software Release 12.2(40)SG or later
- IEEE 802.3af/at and Cisco prestandard PoE, IEEE 802.3x flow control
- Bandwidth is allocated across eight 6-port groups, providing 3 Gbps per port group (2:1)
- L2-4 Jumbo Frame support (up to 9216 bytes)
- Capable of up to 30W of inline power per port on up to 24 ports simultaneously
- Enterprise and commercial: designed to power next-generation IP phones, wireless base stations, video cameras, and other PoE devices
- Campus and branch applications requiring enhanced performance for large file transfers and network backups

Figure 8 shows the WS-X4648-RJ45V-E.

Figure 8. WS-X4648-RJ45V-E Cisco Catalyst 4500E Series 48-Port 802.3af PoE 10/100/1000 (RJ-45)

WS-X4648-RJ45V-E:

- 24 gigabits per-slot capacity
- 48 ports
- 10/100/1000 module (RJ-45)
- Cisco IOS Software Release 12.2(40)SG or later
- Bandwidth is allocated across eight 6-port groups, providing 3 Gbps per port group (2:1)
- L2-4 Jumbo Frame support (up to 9216 bytes)
- IEEE 802.3af and Cisco prestandard PoE, IEEE 802.3x flow control
- Enterprise and commercial: designed to power IP phones, wireless base stations, video cameras, and other IEEE-compliant powered devices
- Campus and branch applications requiring enhanced performance for large file transfers and network backups

Figure 9 shows the WS-X4648-RJ45-E.

Figure 9. WS-X4648-RJ45-E Cisco Catalyst 4500E Series 48-Port Data-only 10/100/1000 (RJ-45)

WS-X4648-RJ45-E:

- 24 gigabits per-slot capacity
- 48 ports
- 10/100/1000 module (RJ-45)
- Cisco IOS Software Release 12.2(50)SG or later
- Bandwidth is allocated across eight 6-port groups, providing 3 Gbps per port group (2:1)
- L2-4 Jumbo Frame support (up to 9216 bytes)
- Enterprise campus, commercial collapsed core, and branch applications requiring enhanced performance for large file transfers and network backups
- Campus and branch applications requiring enhanced performance for large file transfers and network backups
- Service provider: GE/100M aggregation for DSLAM and PON

Cisco Catalyst 4500 Classic Line Cards

Classic 10/100/1000 Ethernet Line Cards

Figure 10 shows the WS-X4548-RJ45V+

Figure 10. WS-X4548-RJ45V+ Cisco Catalyst 4500 48-Port 802.3af PoE and 802.3at PoEP 10/100/1000 (RJ-45)

WS-X4548-RJ45V+:

- 48 ports
- 10/100/1000 (RJ-45)
- Cisco IOS Software Release 12.2(50)SG or later
- IEEE 802.3af/at and Cisco prestandard PoE, IEEE 802.3x flow control
- Bandwidth is allocated across six 8-port groups, providing 1 Gbps per port group
- Capable of up to 30W of inline power per port on up to 24 ports simultaneously
- Enterprise and commercial: designed to power next-generation IP phones, wireless base stations, video cameras, and other PoE devices that require power up to 30 watts

Figure 11 shows the WS-X4548-GB-RJ45V.

Figure 11. WS-X4548-GB-RJ45V Cisco Catalyst 4500 PoE IEEE 802.3af 10/100/1000, 48 Ports (RJ-45)

WS-X4548-GB-RJ45V:

- 48 ports
- 10/100/1000 (RJ-45)
- Cisco IOS Software Release 12.2(18)EW or later
- IEEE 802.3af and Cisco prestandard PoE, IEEE 802.3x flow control
- Bandwidth is allocated across six 8-port groups, providing 1 Gbps per port group
- Enterprise and commercial: designed to power IP phones, wireless base stations, video cameras, and other IEEE-compliant powered devices

Figure 12 shows the WS-X4548-GB-RJ45.

Figure 12. WS-X4548-GB-RJ45 Cisco Catalyst 4500 Enhanced 48-Port 10/100/1000 Module (RJ-45)

WS-X4548-GB-RJ45:

- 48 ports
- 10/100/1000 module (RJ-45)
- Cisco IOS Software Release 12.1(19)EW or later
- IEEE 802.3x flow control
- Bandwidth is allocated across six 8-port groups, providing 1 Gbps per port group
- Enterprise and commercial: designed for gigabit to the desktop

Classic Gigabit Ethernet Fiber Line Card (GBIC or SFP)

The Cisco Catalyst 4500 Series offers a variety of GBIC- or SFP-enabled gigabit solutions for high-performance Gigabit Ethernet uplinks and server farm connectivity. The five GBIC- or SFP-enabled gigabit line-card options for the Cisco Catalyst 4500 Series include 6-, 18-, and 48-port versions. GBIC or SFP technology allows customers to intermix intrabuilding MMF connections and long-distance single-mode connections simply by changing the GBIC or SFP type. (See Table 3 for more information.)

Figure 13 shows the WS-X4306-GB.

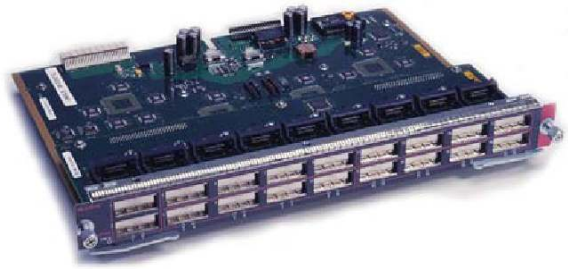
Figure 13. WS-X4306-GB Cisco Catalyst 4500 Gigabit Ethernet Module, 6 Ports (GBIC)

WS-X4306-GB:

- 6 ports
- 1000BASE-X (GBIC)
- Cisco IOS Software Release 12.1(8a)EW or later
- IEEE 802.3
- L2-4 Jumbo Frame support (up to 9216 bytes)
- Enterprise and commercial: designed for high-speed backbone, switch-to-switch applications, or small server farms
- Service provider: GE small aggregation for DSLAM/PON/mobile data backhaul

Figure 14 shows the WS-X4418-GB.

Figure 14. WS-X4418-GB Cisco Catalyst 4500 Gigabit Ethernet Module, Server Switching 18 Ports (GBIC)



WS-X4418-GB:

- 18 ports
- 1000BASE-X (GBIC)
- Cisco IOS Software Release 12.1(8a)EW or later
- IEEE 802.3, IEEE 802.3x flow control
- 2 ports of wire-speed 1000BASE-X Gigabit Ethernet uplinks
- 16 ports: 4:1 oversubscribed
- Enterprise and commercial: designed for fiber to the desktop, switch-to-switch applications, or small server farms

Figure 15 shows the WS-X4448-GB-SFP.

Figure 15. WS-X4448-GB-SFP Cisco Catalyst 4500 Gigabit Ethernet Module, 48 Ports 1000X (SFP)

WS-X4448-GB-SFP:

- 48 ports
- 1000BASE-X (SFP)
- Customers can mix and match 1000BASE-X SFP optics on the same line card
- IEEE 802.3x flow control
- Service provider: Run point-to-point Gigabit Ethernet fiber to the home (FTTX)
- Enterprise and commercial: designed for server farms and switch-to-switch applications

Figure 16 shows the WS-X4506-GB-T.

Figure 16. WS-X4506-GB-T Cisco Catalyst 4500 6-Port 10/100/1000 RJ-45 PoE IEEE 802.3af and 1000BASE-X (SFP)

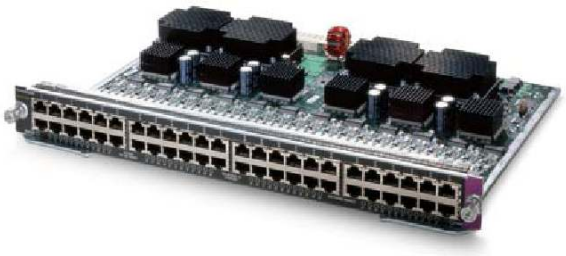
WS-X4506-GB-T:

- 6-port 10/100/1000 and 6-port SFP (any combination of up to 6 ports can be active at one time)
- 10/100/1000 RJ-45 PoE and 1000BASE-X (SFP)
- Cisco IOS Software Release 12.2(20)EWA
- PoE IEEE 802.3af and Cisco prestandard (RJ-45 only)
- Provides full line-rate gigabit switching on all ports
- L2-4 Jumbo Frame support (up to 9216 bytes)
- Designed to give customers the choice of RJ-45 with or without PoE and SFP without incurring extra costs
- Enterprise and commercial: high-performance desktop connectivity and server farms; designed to power IP phones, wireless base stations, video cameras, and other IEEE-compliant appliances
- Service provider: GE small aggregation for DSLAM/PON/mobile data backhaul

Classic 10/100 Ethernet Line Card

Figure 17 shows the WS-X4248-RJ45V.

Figure 17. WS-X4248-RJ45V Cisco Catalyst 4500 PoE IEEE 802.3af 10/100, 48 Ports (RJ-45)

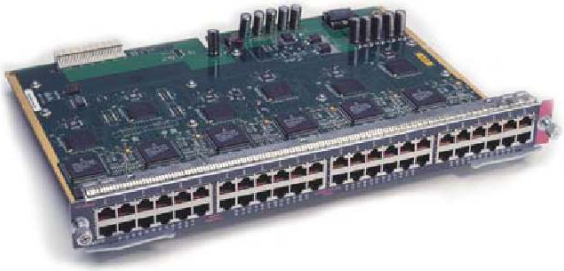


WS-X4248-RJ45V:

- 48 ports
- 10/100 (RJ-45)
- Cisco IOS Software Release 12.2(18)EW or later
- IEEE 802.3af PoE and Cisco prestandard
- Enterprise and commercial: designed to power IP phones, wireless base stations, video cameras, and other IEEE-compliant powered devices

Figure 18 shows the WS-X4148-RJ.

Figure 18. WS-X4148-RJ Cisco Catalyst 4500 10/100 Module, 48 Ports (RJ-45)



WS-X4148-RJ:

- 48 ports
- 10/100BASE-T module (RJ-45)
- Enterprise and commercial: high-port-density solution for desktop connectivity

Classic Fast Ethernet Fiber Line Card

Figure 19 shows the WS-X4248-FE-SFP.

Figure 19. WS-X4248-FE-SFP Cisco Catalyst 4500 Fast Ethernet Switching Module, 48-Port 100BASE-X (SFP)

WS-X4248-FE-SFP:

- 48-port 100BASE-X (SFP optional)
- Customers can mix and match 100BASE-X SFP optics on the same line card
- IEEE 802.3, IEEE 802.3ah, IEEE 802.3x flow control
- Enterprise and commercial: fiber-to-the-desktop applications
- Service providers: running point-to-point Fast Ethernet to the home or business (FTTH)

Specification Summary

Table 2 summarizes product specifications.

Table 2. Port Information for Line Cards

Line Card	Number of Ports	Port Speed	Port Type	Wire Rate	Cisco Catalyst 4500 Series Min/Max Ports		
					4503-E	4506-E/ 4507R-E/ 4507R+E	4510R-E/ 4510R+E
E-Series 10 Gigabit Ethernet Line Cards							
WS-X4712-SFP+E[4]	12	10GBASE-R	SFP+ or SFP	2.5-to-1 with SFP+ 1:1 with SFP	12/24[5]	12/60[5]	12/96[5]
WS-X4606-X2-E	6	10GBASE-X	X2 or SFP with TwinGig Converter Module	2.5-to-1 with X2 1:1 with SFP	6/12[5] 12/24[5]	6/30[5] 12/60[5]	6/30[5] 12/60[5]
E-Series 10/100/1000 Line Cards							
WS-X4748-RJ45V+E	48	10/100/1000	RJ-45 PoE IEEE 802.3at, IEEE 802.3af, Cisco prestandard	1:1	48/96[5]	48/240[5]	48/384[5,6]
WS-X4648-RJ45V+E	48	10/100/1000	RJ-45 PoE IEEE 802.3at, IEEE 802.3af, Cisco prestandard	2-to-1	48/96[5]	48/240[5]	48/384[5,6]

[4] WS-X4712-SFP+E is not supported on 4507R-E and 4510R-E chassis.
[5] E-Series line cards require E-Series chassis.
[6] Requires Sup7-E to support greater than 240 ports on 4510R+E and 4510R-E chassis.

Line Card	Number of Ports	Port Speed	Port Type	Wire Rate	Cisco Catalyst 4500 Series Min/Max Ports		
					4503-E	4506-E/ 4507R-E/ 4507R+E	4510R-E/ 4510R+E
WS-X4648-RJ45V-E	48	10/100/1000	RJ-45 PoE IEEE 802.3af, Cisco prestandard	2-to-1	48/96[5]	48/240[5]	48/384[5,6]
WS-X4648-RJ45-E	48	10/100/1000	RJ-45	2-to-1	48/96[5]	48/240[5]	48/384[5,6]
E-Series Gigabit Ethernet SFP Line Cards							
WS-X4624-SFP-E	24	1000	Pluggables	1:1	24/48	24/120	24/168
WS-X4612-SFP-E	12	1000	Pluggables	1:1	12/28	12/64	12/100
Classic 10/100/1000 Line Cards							
WS-X4548-RJ45V+	48	10/100/1000	RJ-45 PoE IEEE 802.3at, IEEE 802.3af, Cisco prestandard	8-to-1[7]	48/96	48/240	48/384
WS-X4548-GB-RJ45V	48	10/100/1000	RJ-45 PoE IEEE 802.3af and Cisco prestandard	8-to-1[7]	48/96	48/240	48/384
WS-X4524-GB-RJ45V	24	10/100/1000	RJ-45 PoE IEEE 802.3af and Cisco prestandard	4-to-1[7]	24/48	24/120	24/168
WS-X4548-GB-RJ45	48	10/100/1000	RJ-45	8-to-1[7]	48/96	48/240	48/384
Classic Gigabit Ethernet Fiber (GBIC or SFP) Line Cards							
WS-X4306-GB	6	1000BASE-X	GBIC	Yes	6/12	6/30	6/42
WS-X4418-GB	18	1000BASE-X	GBIC	2 ports full 16 ports 4-to-1[7]	18/36	18/90	18/126
WS-X4448-GB-LX	48	1000BASE-LX	48 SFPs (included)	8-to-1[7]	48/96	48/240	48/384
WS-X4448-GB-SFP	48	1000BASE-X	SFP	8-to-1[7]	48/96	48/240	48/384
WS-X4506-GB-T	6 + 6	10/100/1000	1000BASE-X (SFP) RJ-45 PoE IEEE 802.3af and Cisco prestandard	Yes	6/12	6/30	6/42
Classic Fast Ethernet Fiber Line Cards							
WS-X4248-FE-SFP	48	100BASE-X	SFP	Yes	48/96	48/240	48/384
Classic 10/100 Ethernet Line Cards							
WS-X4148-RJ	48	10/100	RJ-45	Yes	48/96	48/240	48/384
WS-X4248-RJ45V	48	10/100	RJ-45 PoE IEEE 802.3af and Cisco prestandard	Yes	48/96	48/240	48/384

Optics

Cisco Catalyst 4500 line cards provide a variety of optical port types and port speeds: SFP+, X2, SFP, GBIC, 100BASE-FX, and so on. For details about the different optical modules supported by each line card and the minimum Cisco IOS Software release required for each of the supported optical modules, visit http://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html.

[7] The amount of oversubscription can be controlled by varying the number of ports used at 1000 Mbps. All ports can use Gigabit EtherChannel or IEEE 802.3ad for high-speed interconnection applications. All oversubscribed ports use the standard IEEE 802.1x flow control (PAUSE frame) mechanism to control Gigabit Ethernet host traffic.

Product Specification

Table 3 lists product specifications.

Table 3. Product Specifications

Feature	Description
Standards	• Gigabit Ethernet: IEEE 802.3z, IEEE 802.3x, IEEE 802.3ab, IEEE 803.3at, IEEE 802.3af • 1000BASE-X (GBIC), 1000BASE-SX, 1000BASE-LX/LH, 1000BASE-ZX, CWDM
EtherChannel technology	• Gigabit EtherChannel: All 1000 Mbps ports • 10 Gigabit EtherChannel: All 10Gbps ports • IEEE 802.3ad (Link Aggregation Control Protocol): All 1000 Mbps ports • Port Aggregation Protocol (PagP): Yes • Number of ports per tuple: 8 • EtherChannel and IEEE 802.3ad technology across line cards: Yes
Physical dimensions	• Occupies one slot in the Cisco Catalyst 4500 Series platform • Dimensions (H x W x D): 1.2 x 14.25 x 10.75 in. (3.0 x 36.2 x 27.3 cm)
Environmental conditions	• Operating temperature: 32°to 104℉ (0°to 40℃) • Storage temperature: -40°to 167℉ (-40°to 75℃) • Relative humidity: 10 to 90%, noncondensing • Operating altitude: -60 to 4000m
Safety conditions	Fiber optic lasers: Class 1 laser products
Safety certifications	• UL 1950 • EN 60950 • CSA-C22.2 no 950 • IEC 950
Electromagnetic emissions certifications	• FCC 15J Class A • VCCI Class A • CE Marking • EN 55022 Class A • EN 55024 Class A • CISPR 22 Class A • AS/NZ 3548 • NEBS Level 3 (GR-1089-CORE, GR-63-CORE) • ETSI ETS-300386-2
ROHS Compliance	ROHS5

Power and MTBF Information

Table 4 gives power and MTBF information for different line cards.

Table 4. Power and MTBF Information

Part Number	Max Rated Power (W)	Rated MTBF (Hours)
WS-X4748-RJ45V+E	75	183,330
WS-X4712-SFP+E	90	387,172
WS-X4624-SFP-E	45	591,109
WS-X4612-SFP-E	30	676,740
WS-X4648-RJ45-E	89	280,365
WS-X4648-RJ45V-E	92	280,365
WS-X4648-RJ45V+E	92	280,365
WS-X4606-X2-E	50	535,717
WS-X4548-GB-RJ45V	60	434,646
WS-X4548-RJ45V+	60	239,436
WS-X4548-GB-RJ45	60	171,356

Part Number	Max Rated Power (W)	Rated MTBF (Hours)
WS-X4506-GB-T	30	392,098
WS-X4306-GB	35	570,262
WS-X4418-GB	80	355,330
WS-X4448-GB-SFP	65	290,732
WS-X4248-FE-SFP	53	687,828
WS-X4148-RJ	65	350,860
WS-X4248-RJ45V	60	187,594

Note: All power numbers shown in Table 4 are maximum values recommended for facility power and cooling capacity planning. These figures are not indicative of the actual power draw during operation. Typical power draw is about 20 percent lower than the maximum value shown.

Ordering Information

To place an order, visit the Cisco Ordering homepage. Table 5 gives ordering information.

Table 5. Ordering Information

Part Number ("=" indicates "spare")	Product Name
WS-X4748-RJ45V+E (=)	Cisco Catalyst 4500E Series 48-Port 802.3at PoEP 10/100/1000 (RJ-45)
WS-X4712-SFP+E (=)	Cisco Catalyst 4500E Series 12-port 10 Gigabit Ethernet (SFP+)
WS-X4624-SFP-E (=)	Cisco Catalyst 4500E Series 24-Port GE (SFP)
WS-X4612-SFP-E (=)	Cisco Catalyst 4500E Series 12-Port GE (SFP)
WS-X4648-RJ45-E (=)	Cisco Catalyst 4500E Series 48-port 10/100/1000 (RJ-45)
WS-X4648-RJ45V-E (=)	Cisco Catalyst 4500E Series 48-port 802.3af PoE 10/100/1000 (RJ-45)
WS-X4648-RJ45V+E (=)	Cisco Catalyst 4500E Series 48-Port 802.3af PoE and PoEP- 10/100/1000 (RJ-45)
WS-X4606-X2-E (=)	Cisco Catalyst 4500E Series 6-port 10 Gigabit Ethernet (X2)
WS-X4548-GB-RJ45V(=)	Cisco Catalyst 4500 PoE IEEE 802.3af 10/100/1000, 48 ports (RJ-45)
WS-X4548-RJ45V+(=)	Cisco Catalyst 4500 PoE IEEE 802.3af and PoEP-ready 10/100/1000, 48 ports (RJ-45)
WS-X4548-GB-RJ45(=)	Cisco Catalyst 4500 Enhanced 48-port 10/100/1000 Module (RJ-45)
WS-X4506-GB-T(=)	Cisco Catalyst 4500 6-port 10/100/1000 RJ-45 PoE IEEE 802.3af and 1000BASE-X (SFP)
WS-X4306-GB(=)	Cisco Catalyst 4500 Gigabit Ethernet Module, 6 ports (GBIC)
WS-X4418-GB(=)	Cisco Catalyst 4500 Gigabit Ethernet Module, server switching 18 ports (GBIC)
WS-X4448-GB-SFP(=)	Cisco Catalyst 4500 Gigabit Ethernet Module, 48-port 1000X (SFP)
WS-X4248-FE-SFP (=)	Cisco Catalyst 4500 Fast Ethernet Switching Module, 48-port 100BASE-X (SFP)
WS-X4148-RJ(=)	Cisco Catalyst 4500 10/100 Module, 48 ports (RJ-45)
WS-X4248-RJ45V(=)	Cisco Catalyst 4500 PoE IEEE 802.3af 10/100, 48 ports (RJ-45)

Warranty

Cisco Catalyst 4500E Series and Cisco Catalyst 4500 switches are covered by the Cisco limited lifetime hardware warranty. For more information, see this document at http://www.cisco.com/en/US/docs/general/warranty/English/LH2DEN__.html.

If you purchased a Cisco Catalyst 4500 Series line card before May 1, 2009, it is covered by the Cisco 90-day limited hardware warranty. For more information, see this document at http://www.cisco.com/en/US/docs/general/warranty/English/901DEN__.html.

Service and Support

Cisco offers a wide range of services programs to accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners, resulting in high levels of customer satisfaction. Cisco Services help you to protect your network investment, optimize network operations, and prepare the network for new applications to extend network intelligence and the power of your business. For more information about Cisco Services, see Cisco Technical Support Services or Cisco Advanced Services.

For More Information

For more information about the Cisco Catalyst 4500 Series line cards, visit http://www.cisco.com/en/US/products/hw/switches/ps4324/index.html or contact your local account representative.

For more information about Cisco transceiver modules compatible with Cisco Catalyst 4500 Series line cards, visit http://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html.

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