

Cisco Catalyst 4500 Series Line Cards

High-Performance, Mobile, and Secure User Experience

Product Benefits

Cisco® Catalyst® 4500 Series Switches enable borderless unified wired and wireless 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 Switch 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 (TCO) and superior investment protection.

The Cisco Catalyst 4500 Switch 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 (TCO).

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. Two types of E-Series line cards are available 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 8-E, Supervisor Engine 7-E, Supervisor Engine 7L-E
Cisco Catalyst 4500 47xx E-Series Line Cards Note: WS-X4712-SFP+E and WS-X4748-12X48U+E are not supported on 4507R-E and 4510R-E	24 Gbps	Cisco Catalyst 4507R-E and 4510R-E	Supervisor Engine 8-E, Supervisor Engine 7-E, Supervisor Engine 7L-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 ¹	Supervisor Engine 8-E, Supervisor Engine 7-E, Supervisor Engine 7L-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 8-E ² , Supervisor Engine 7-E ³ , Supervisor Engine 7L-E ⁴ , Supervisor Engine 6-E, Supervisor Engine 6L-E3, 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) and Universal POEP (UPOE). PoE provides power over 100 m of standard unshielded twisted-pair (UTP) cables when an IEEE 802.3af/at-compliant or Cisco pre-standard powered device is attached to the PoE/PoEP and UPOE 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 and UPOE line cards. For the regular DC (Direct Current) device that doesn't support PoE/PoEP natively, Cisco Catalyst 4500 Series provides the UPOE Power Splitter that enables an UPOE port to power a 12V DC power device and another PoE/PoEP appliance. 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. Table 2 shows the PoE options for Cisco Catalyst 4500 Series line cards.

Although all references to “PoE/PoEP/UPOE,” “inline power,” and “voice” power supplies and line cards are synonymous, there are currently four versions: Cisco prestandard, IEEE 802.3af compliant, IEEE 802.3at compliant, and UPOE. 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. UPOE line cards require E series chassis. All IEEE 802.3af/at-compliant and UPOE 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.

¹ Slots 8-10 on 4510R-E and 4510R+E chassis do not support E-Series line cards with Supervisor Engine 6-E.

² Supervisor Engine 8-E does not support non-E-Series chassis: 4503, 4506, 4507R, and 4510R.

³ Supervisor Engine 7-E does not support non-E-Series chassis: 4503, 4506, 4507R, and 4510R.

⁴ Supervisor Engine 7L-E does not support non-E-Series chassis: 4503, 4506, 4507R, and 4510R.

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. Two types of E-Series line cards are available, 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 PoEP E-Series 47xx line card provides standard IEEE 802.3at PoEP support on all 48 ports simultaneously. All series 47xx line cards support standard IEEE 802.1AE encryption and Cisco TrustSec™ in hardware. The Cisco Catalyst 4500 48-port 10/100/1000/multigigabit line cards are available in five versions: Data Only, PoE, PoEP, UPOE, and UPOE with multigigabit support for 802.11ac Wave2.

Table 2. Cisco Catalyst 4500 Line Card PoE Options

Line-Card Type	Data Only (No PoE)	PoE (802.3af)	PoEP (802.3at)	UPOE
Cisco Catalyst 4500 47xx E-Series Line Cards	Yes	Yes	Yes	Yes
Cisco Catalyst 4500 46xx E-Series Line Cards	Yes	Yes	Yes	-
Cisco Catalyst 4500 Series Classic Line Cards	Yes	Yes	Yes	-

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. The two varieties of fast Ethernet copper line cards are:

- 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.

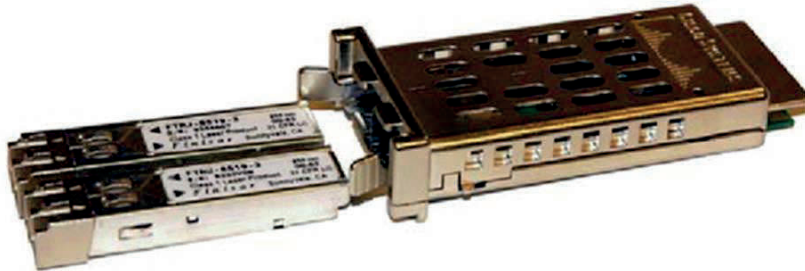
The Cisco Catalyst 4500E Series 12-port 10 Gigabit Ethernet line card (2.5:1 oversubscribed) can be deployed for high-performance and high-density 10 Gigabit Ethernet aggregation in the campus and in small to medium-sized networks as a core switch. The Cisco Catalyst 4500E Series 12-port 10 Gigabit Ethernet 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.

The Cisco Catalyst 4500 Series offers oversubscribed Gigabit Ethernet fiber line cards optimized for FTTD and FTTH deployments. The Cisco Catalyst 4500 Series 48 module Gigabit line card (8:1 oversubscribed) provides switching at 6Gbps per slot and can be used for higher density deployments.

The Cisco Catalyst 4500E Series 40 module Gigabit line card (2:1 oversubscribed) provides switching at 24Gbps per slot and can be used for enterprise deployments that require higher density and lower oversubscription. This line card also supports a specialized BX optics (compact SFP) that doubles the density to 80 ports per line card using 40 module, making it attractive for the FTTH deployment. The CSFP is a dual bidirectional SFP type that has the same form factor as a regular SFP, but can support 2 users that use BX type of optics (Figure 2).

Figure 2. Compact SFP



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 offer 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 four queues per port will automatically have capability for eight queues per port if redeployed with a Supervisor Engine 8-E/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 that 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 3 shows the WS-X4712-SFP+E.

Figure 3. 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 4 shows the WS-X4606-X2-E.

Figure 4. WS-X4606-X2-E Cisco Catalyst 4500E Series 6-Port 10 Gigabit Ethernet (X2)



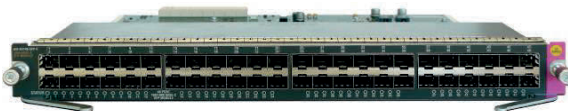
WS-X4606-X2-E:

- 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 5 shows the WS-X4748-SFP-E.

Figure 5. WS-X4748-SFP-E



WS-X4748-SFP-E:

- 48-port nonblocking SFP line card, providing 48 gigabits per-slot capacity
- Cisco IOS Software Release IOS-XE3.5.0E/15.2(1)E or later
- Support 1G/100FX SFP (mix and match as well) at line rate
- IEEE 802.1AE Fiber Encryption and Cisco TrustSec capability in hardware
- L2-4 Jumbo Frame support (up to 9216 bytes)
- Inherits Supervisor Engine QoS capability
- Supported on all 3, 6, 7 (R-E & R+E) and 10 (R-E & R+E) slot chassis
- Enterprise, mid-market, and commercial core and distribution deployments requiring line-rate capability
- Service provider: GE aggregation for DSLAM/PON/mobile data backhaul; Point-to-Point fiber to the home (FTTH) or building (FTTB) for residential and business applications
- Enterprise: Providing Fiber to the Desktop (FTTD), for deployments where non-blocking is mandatory requirement

Figure 6 shows the WS-X4724-SFP-E.

Figure 6. WS-X4724-SFP-E

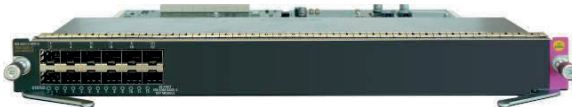


WS-X4712-SFP-E:

- 24-port nonblocking SFP line card, providing 24 gigabits per-slot capacity
- Cisco IOS Software Release IOS-XE3.5.0E/15.2(1)E or later
- Support 1G/100FX SFP (mix and match as well) at line rate
- IEEE 802.1AE Fiber Encryption and Cisco TrustSec capability in hardware
- L2-4 Jumbo Frame support (up to 9216 bytes)
- Inherits Supervisor Engine QoS capability
- Supported on all 3, 6, 7 (R-E & R+E) and 10 (R-E & R+E) slot chassis
- Enterprise, mid-market, and commercial core and distribution deployments requiring line-rate capability
- Service provider: GE aggregation for DSLAM/PON/mobile data backhaul

Figure 7 shows the WS-X4712-SFP-E.

Figure 7. WS-X4712-SFP-E



WS-X4712-SFP-E:

- 12 Port nonblocking SFP line card, providing 12 gigabits per-slot capacity
- Cisco IOS Software Release IOS-XE3.5.0E/15.2(1)E or later
- Support 1G/100FX SFP (mix and match as well) at line rate
- IEEE 802.1AE Fiber Encryption and Cisco TrustSec capability in hardware
- L2-4 Jumbo Frame support (up to 9216 bytes)
- Inherits Supervisor Engine QoS capability
- Supported on all 3, 6, 7 (R-E & R+E) and 10 (R-E & R+E) slot chassis
- Enterprise, mid-market, and commercial core and distribution deployments requiring line-rate capability
- Service provider: GE aggregation for DSLAM/PON/mobile data backhaul

Figure 8 shows the WS-X4624-SFP-E.

Figure 8. WS-X4624-SFP-E



WS-X4612-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 9 shows the WS-X4612-SFP-E.

Figure 9. WS-X4612-SFP-E



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