

# Cisco Catalyst 4500E Supervisor Engine 7-E: Leading Borderless Network Access and Aggregation Supervisor Engine

## Overview

Establishing borderless leadership is now easier than ever to achieve with the new Cisco® Catalyst® 4500E Supervisor Engine 7-E (Figure 1), an enterprise-class borderless network access and aggregation supervisor engine designed to provide 848 Gbps per system with E-Series chassis. Cisco Catalyst 4500E Supervisor Engine 7-E is the first Cisco Catalyst supervisor engine to provide 48 Gbps per slot with Flexible NetFlow, Advanced Security, combined with reduced total cost of ownership (TCO) and excellent investment protection. With these capabilities, 4 10G uplinks and 10/100/1000 PoE, PoEP and UPOE ports, this supervisor engine is undoubtedly Cisco's leading borderless network access Catalyst supervisor engine. Supervisor Engine 7-E is built with price-performance aggregation deployments in mind, providing increased Gigabit Ethernet and 10 Gigabit Ethernet fiber density along with hardware capabilities to support enterprise-class aggregation functionalities. Supervisor Engine 7-E facilitates borderless user experiences for enterprise, public sector, mid-market, and commercial customer deployment business-critical applications.

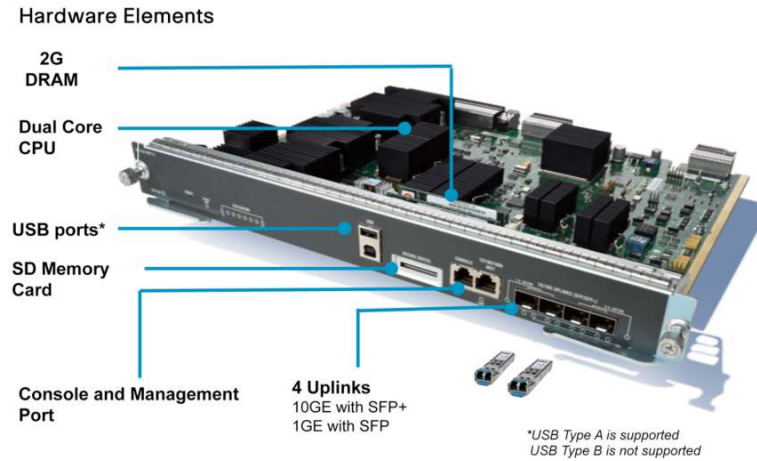
Borderless network leadership is extended with important drivers - Hardware readiness for Cisco TrustSec™, medianet, Flexible NetFlow, Cisco EnergyWise, Cisco Powered Workspace - and other feature enhancements enabled by the Cisco Catalyst 4500E Supervisor Engine 7-E. Backward and forward compatibility with most existing Cisco Catalyst 4500 and 4500E line cards assures deeper customer satisfaction with the industry's best investment protection architecture. Cisco Catalyst Supervisor Engine 7-E is supported in E-Series chassis only.

The Cisco Catalyst 4500E Supervisor Engine 7-E delivers several new technology breakthroughs and industry firsts, extending the Cisco Catalyst 4500 Series placement from premium wiring closet solution into next-generation borderless access and aggregation deployments.

The Supervisor Engine 7-E offers the following key leading innovations and capabilities:

- Enables 10+ years of investment protection through backward and forward compatibility
- Cisco Catalyst switch with 48 Gbps per slot (848 G per system)
- Enables around 5 microseconds of latency to and from any 10G port
- First Cisco Catalyst switch with campus Flexible NetFlow (FNF)
- First Cisco Catalyst switch offering Cisco IOS® XE Modular Software services
- First Cisco Catalyst switch with less than 200ms ISSU high availability
- First Cisco Catalyst switch for next generation Cisco Powered Workspace (EEE, UPOE)
- First and only modular switch with 8 bi-directional line rate SPAN and/or RSPAN sessions

**Figure 1.** Cisco Catalyst 4500E Supervisor Engine 7-E



## Cisco Catalyst 4500E Supervisor Engine 7-E Feature Highlights

The Cisco Catalyst 4500E Supervisor Engine 7-E is the first Cisco Catalyst supervisor engine to provide nonblocking 48 Gbps per slot bandwidth and Flexible NetFlow for optimized application visibility. In addition to this, the enterprise-class Cisco Catalyst 4500E Supervisor Engine 7-E offers the following:

- Performance/Scalability
  - 848 Gbps switching capacity with 250 Mpps of throughput
  - 4 nonblocking 10 Gigabit Ethernet uplinks [SFP+]
  - SFP support on uplinks to offer flexibility for up to 4 Gigabit Ethernet
  - 384 ports of nonblocking 10/100/1000
  - PoEP (30W) capabilities on all ports in a line card simultaneously
  - UPOE (60W) capabilities on all line card slots
  - Energy Efficient Ethernet (IEEE 802.3az)
  - 196 ports of nonblocking Gig SFP
  - 100 ports of 10G SFP+ (4 Uplinks ports + 96 Line card ports)
  - 128K Flexible NetFlow entries in hardware
  - External USB and SD card support for flexible storage options
  - 256K Routing Entries for high-end campus access and aggregation deployments
  - IPv6 support in hardware, providing wire-rate forwarding for IPv6 networks
  - Dynamic hardware forwarding-table allocations for ease of IPv4-to-IPv6 migration
  - Scalable routing (IPv4, IPv6, and multicast) tables, Layer 2 tables, and ACL and QoS entries to make use of 8 queues per port and comprehensive security policies per port
- Infrastructure Services
  - Cisco IOS XE Software, the modular open application platform for virtualized borderless services
  - Maximum resiliency with redundant components, Nonstop Forwarding/Stateful Switchover (NSF/SSO), and In-Service Software Upgrade (ISSU) support

- Network virtualization through Multi-VRF technology for Layer 3 segmentation
- Automation through Embedded Event Manager (EEM), Cisco Smart Call Home, AutoQoS, and Auto SmartPorts for fast provisioning, diagnosis, and reporting
- Borderless Network Services
  - Optimized application performance through deep visibility with Flexible Netflow supporting rich Layer 2/3/4 information (MAC, VLAN, TCP Flags) and synthetic traffic monitoring with IP SLA
  - Medianet capabilities to simplify video quality of service, monitoring, and security
  - Energy efficient design with Cisco EnergyWise technology to manage network, PoEP, and PC
- Investment Protection and Reduced TCO
  - Full backward compatibility with 6 G, 24 G, and 48 Gbps slot line cards with no performance degradation

The Cisco Catalyst 4500E Supervisor Engine 7-E is compatible with classic Cisco Catalyst 4500 line cards, and power supplies, providing full investment protection. Supervisor Engine 7-E is not compatible with classic Catalyst 4500 chassis. When you deploy the Cisco Catalyst 4500E Supervisor Engine 7-E with classic line cards, all of the new features except the 24 Gbps and 48 Gbps per-slot switching capacity are inherited.

## Predictable Performance and Scalability

The Supervisor Engine 7-E is the first Cisco Catalyst supervisor engine to provide 48 Gbps per slot switching capacity. Table 1 highlights the performance and scalability enhancements of the Cisco Catalyst 4500E Supervisor Engine 7-E.

**Table 1.** Cisco Catalyst 4500E Supervisor Engine 7-E Performance and Scalability Features

Feature and Description	Supervisor Engine 7-E
<b>Centralized Switching Capacity</b>	848 Gbps
<b>Per-Slot Switching Capacity</b>	48 Gbps
<b>Throughput</b>	<ul style="list-style-type: none"> <li>• 250 Mpps for IPv4</li> <li>• 125 Mpps for IPv6</li> </ul>
<b>IPv4 Routing Entries</b>	256,000
<b>IPv6 Routing Entries</b>	128,000
<b>Multicast Routes</b>	16,000 (Available with Cisco IOS XE 3.1.0 SG) 32,000 (Available with Cisco IOS XE 3.2.0 SG or later)
<b>CPU</b>	Dual Core 1.5 GHz
<b>CPU Queues</b>	64
<b>Synchronous Dynamic RAM (SDRAM)</b>	2 GB upgradable to 4 GB
<b>NVRAM</b>	1G
<b>Security and QoS Hardware Entries</b>	128,000
<b>Cisco Network Admission Control (NAC) and Dynamic Host Configuration Protocol (DHCP) Snooping Entries</b>	12,000
<b>MAC addresses</b>	55,000
<b>Active VLANs</b>	4,094
<b>ARP Entries</b>	47,000
<b>Spanning Tree Protocol Instances</b>	10,000
<b>Switched Virtual Interfaces (SVIs)</b>	4,094
<b>Switched Port Analyzer (SPAN)</b>	Maximum of 8 sessions: ingress and/or egress

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The Supervisor Engine 7-E is also optimized for multimedia applications with its advanced multicast support offered by features such as Protocol Independent Multicast (PIM) and Source-Specific Multicast (SSM), giving your network additional scalability to support multimedia applications.

## Continued Innovations Through Infrastructure Services

### Modular Open Application Platform, Cisco IOS XE Software

Cisco IOS XE Software is the next generation operating system for the Cisco Catalyst 4500E Supervisors, beginning with the Supervisor 7-E. Cisco continues to evolve Cisco IOS Software to support next-generation switching hardware and provide increased architectural flexibility to deliver quick adoption of future Cisco Borderless Networks services, while making sure of customer investment protection in Cisco IOS Software.

Cisco IOS XE Software provides the following customer benefits:

- Cisco IOS XE Software provides a modern operating system that can take advantage of the multicore CPU architecture of the next generation Cisco Catalyst 4500E system with Supervisor 7-E.
- Cisco IOS XE Software makes sure of customer investment protection in the existing Cisco IOS Software. With Cisco IOS XE Software, today's Cisco IOS Software becomes a "Cisco IOS Software package" with a consistent feature set and operational look and feel. This allows a transparent migration experience.
- Cisco IOS XE Software supports service virtualization capability that allows the Cisco Catalyst 4500E to host applications other than Cisco IOS Software, such as customer written applications, or third-party applications in parallel with Cisco IOS Software. The hosted application can communicate with Cisco IOS Software to use its rich feature sets. This benefit allows a customer to quickly adopt new technologies using proven code, while keeping Cisco IOS Software simple and robust. Cisco IOS XE Software enables Cisco Catalyst 4500E to be an open service platform and is a primary anchor to enable future Cisco Borderless Networks innovations.

### Best-in-Class Resiliency

The Cisco Catalyst 4500E Series was designed for excellent nonstop communications with noninterrupted hardware switching. With Cisco IO XE Software customers continue to reap the benefit of this best-in-class resiliency in various ways.

ISSU allows you to upgrade or downgrade complete Cisco IOS Software images with minimal (less than 200msec) to no disruption to the network when using a redundant Cisco Catalyst 4500E Series system with dual supervisor engines 7-E. Facilitating rapid, nondisruptive software upgrade for new line cards, new power supplies, new features, or bug fixes, ISSU offers continuous packet forwarding during the supervisor-engine switchover running different Cisco IOS Software releases.

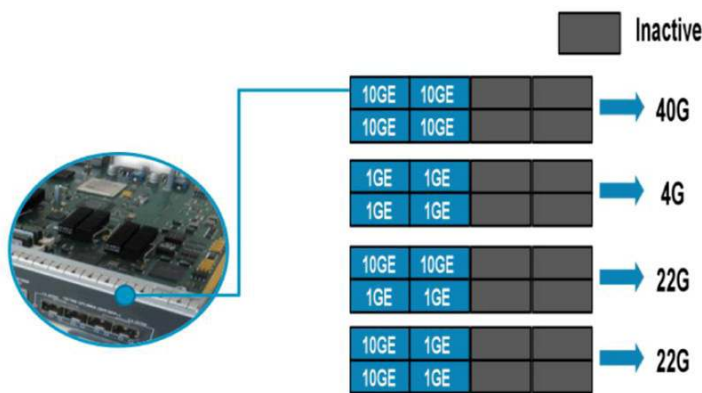
NSF/SSO offers continuous packet forwarding during supervisor-engine switchover. Information is fully synchronized between supervisor engines to allow the standby supervisor engine to immediately take over in subsecond time if the primary fails.

NSF/SSO and ISSU dramatically improve the network reliability and availability in a Layer 2 or Layer 3 environment. NSF/SSO and ISSU are essential for business-critical applications such as voice over IP (VoIP). These features help ensure that VoIP calls are not dropped.

In addition to redundant power supplies, fans, and clock modules, the Cisco Catalyst 4510R+E, 4507R+E, 4510R-E, and 4507R-E chassis models support 1 + 1 supervisor-engine redundancy, using the Supervisor Engine 7-E. The primary supervisor engine is active and is responsible for normal system operation. The secondary supervisor engine serves as a standby, monitoring the operation of the primary supervisor engine. The resiliency features of the Cisco Catalyst 4500E prevent network outages that could result in lost business and revenue.

Apart from the above, Supervisor Engine 7-E has resiliency built into its uplinks. Figure 2 shows the uplink options on Supervisor Engine 7-E.

**Figure 2.** High-Availability and Uplink Options for Supervisor Engine 7-E



### Simplified Operations through Automation

As campus switching has grown to support increasing enterprise demands, so has the need to deploy and manage new and evolving technologies. Simplified operations are critical in meeting these challenges and achieving increased operational efficiency through proactive management and reduction in unplanned network downtime.

The Cisco Catalyst Supervisor Engine 7-E offers the following rich set of capabilities for simplified operations:

- Auto Install and AutoQoS for fast deployment
- Config Rollback for improved config management
- EEM, Smart Call Home, GOLD, TDR for simplified operations
- Flexible NetFlow and IP SLA for enhanced visibility
- Cisco EnergyWise for simplified power management
- ISSU for simplified change management

### Optimized Application Visibility with Flexible NetFlow

Cisco IOS Flexible NetFlow is the next generation in flow technology, allowing optimization of the network infrastructure, reducing operation costs, improving capacity planning and security incident detection with increased flexibility and scalability. The Cisco Catalyst 4500E Supervisor Engine 7-E is the first Cisco Catalyst supervisor engine to provide optimized application visibility with Flexible NetFlow with a capability of 128K Flexible NetFlow Entries. The Supervisor Engine 7-E, with custom-built ASIC, delivers next-generation flow technology with unprecedented flexibility and comprehensive visibility extending from Layer 2 (MAC, VLAN) to Layer 4 (TCP, UDP flags, and so on).

The flow data collected by Flexible NetFlow can be exported to external collector for analysis and reporting, or tracked by Embedded Event Manager (EEM). The Cisco Catalyst 4500E Supervisor Engine 7-E enables powerful, on-box and customizable event correlation and policy actions with EEM. This allows the switches to trigger customized event alarms or policy actions when the predefined condition is met. With no external appliance required, customers are able to use existing infrastructure to perform traffic monitoring, making traffic analysis economical even on large IP network.

Details on Cisco Flexible NetFlow are available at

[http://www.cisco.com/en/US/prod/collateral/iosswrel/ps6537/ps6555/ps6601/ps6965/product\\_data\\_sheet0900aecd804b590b.html](http://www.cisco.com/en/US/prod/collateral/iosswrel/ps6537/ps6555/ps6601/ps6965/product_data_sheet0900aecd804b590b.html).

### Investment Protection with Chassis and Line Card Support

Already-installed Cisco Catalyst 4500E chassis with classic and E-Series line cards can take advantage of the new features and functions of the Supervisor Engine 7-E on all ports with a simple supervisor-engine upgrade. However, to take advantage of the increased switching capacity of 48 Gbps per slot, the Cisco Catalyst 4500E Series chassis (including R+E chassis) and the select new E-Series line cards are required. You can mix and match Cisco Catalyst 4500E Series line cards and classic line cards in an E-Series chassis with no performance degradation to either line-card type. Table 2 shows the supervisor-engine and line-card slot-assignment options in the Cisco Catalyst 4500E Series chassis.

**Table 2.** Cisco Catalyst 4500E Chassis Slot-Assignment Options

Chassis	Single Supervisor Engine 7-E Slot Assignments	Redundant Supervisor Engine 7-E Slot Assignments	E-Series Line-Card Slot Options	Classic Line-Card Slot Options
Cisco Catalyst 4503-E	Slot 1	-	Slots 2 and 3	Slots 2 and 3
Cisco Catalyst 4506-E	Slot 1	-	Slots 2 through 6	Slots 2 through 6
Cisco Catalyst 4507R+E	Slot 3 or 4	Slots 3 or 4	Slots 1, 2, and 5 to 7	Slots 1, 2, and 5 to 7
Cisco Catalyst 4510R+E	Slots 5 or 6	Slots 5 or 6	Slots 1 to 4, and 7 to 10	Slots 1 to 4, and 7 to 10
Cisco Catalyst 4507R-E	Slot 3 or 4	Slots 3 or 4	Slots 1, 2, and 5 to 7	Slots 1, 2, and 5 to 7
Cisco Catalyst 4510R-E	Slots 5 or 6	Slots 5 or 6	Slots 1 to 4, and 7 to 10	Slots 1 to 4, and 7 to 10

Table 3 summarizes the performance capacities of the Supervisor Engine 7-E on a per-chassis basis.

**Table 3.** Cisco Catalyst 4500 Supervisor Engine 7-E Bandwidth per slot for different Chassis

	Cisco Catalyst 4503-E Chassis	Cisco Catalyst 4506-E Chassis	Cisco Catalyst 4507R+E Chassis	Cisco Catalyst 4510R+E Chassis	Cisco Catalyst 4507R-E Chassis	Cisco Catalyst 4510R-E Chassis
Supervisor Engine 7-E (WS-X45-Sup 7-E)	48Gbps/Slot	48 Gbps/Slot	48 Gbps/Slot	48 Gbps/Slot	24 Gbps/Slot	24 Gbps/Slot

## IPv6 Support

IPv6 is important for the future of IP networking and is critical for the expansion of IP address space in the future. IPv6 capability is required by many companies and is being mandated by governments worldwide. The Cisco Catalyst 4500 Supervisor Engine 7-E supports IPv6 Unicast and Multicast in hardware for full line-rate forwarding performance of up to 125 Mpps. The Supervisor Engine 7-E also dynamically allocates hardware table space between IPv4 and IPv6 routes to maximize table space usage for optimal IPv4-to-IPv6 migration. The Supervisor Engine 7-E supports Multicast Listener Discovery (MLD) Snooping for IPv6, enhancing performance and reducing network traffic by allowing a switch to dynamically add and remove hosts from a multicast group.

Table 4 highlights the IPv6 capabilities of the Supervisor Engine 7-E.

**Table 4.** Summary of Supervisor Engine 7-E IPv6 Capabilities

Feature and Description	Supervisor Engine 7-E
IPv6 Support	Unicast and Multicast forwarding done in hardware
IPv6 Performance	125 Mpps
IPv6 Routing Entries	128,000
Dynamic Hardware Route Table Allocations	Yes
MLD Snooping for IPv6	Yes, in hardware
uRPFv6: Strict Mode	Yes, in hardware

## Features at a Glance

**Cisco IOS XE Software LAN Base:** Feature set on the Supervisor 7-E based bundles. Focused on providing Layer 2 features for access.

**Cisco IOS XE Software IP Base:** Upgradable with a software activation license (SAL). Includes all Layer 2 features and some basic Layer 3 features. ISSU/SSO is supported in this package.

**Cisco IOS XE Software Enterprise Services:** Upgradable with a SAL; supports full Layer 3 protocols and advanced features such as complete routing scalability (256K), BGP, Virtual Routing and Forwarding, Policy-Based Routing, and so on.

These features can be enabled using the software-licensing mechanism. For details on software licensing, see “Licensing” section later in this document or visit <http://www.cisco.com/go/sa>.

For details on the supported features in above 3 images see Cisco IOS XE 3.1.0 SG Release Notes below. [http://www.cisco.com/en/US/docs/switches/lan/catalyst4500/release/note/OL\\_23474.html](http://www.cisco.com/en/US/docs/switches/lan/catalyst4500/release/note/OL_23474.html).

## Industry Standards

- Ethernet: IEEE 802.3
- 10 Gigabit Ethernet: IEEE 802.3ae
- IEEE 802.1D Spanning Tree Protocol
- IEEE 802.1w Rapid Reconfiguration of Spanning Tree
- IEEE 802.1s Multiple VLAN Instances of Spanning Tree
- IEEE 802.3ad LACP
- IEEE 802.1p CoS Prioritization

- IEEE 802.1Q VLAN
- IEEE 802.1X User Authentication
- RMON I and II standards

### Supported Cisco Catalyst 4500E Series Line Cards and Modules

- WS-X4748-UPOE+E: Cisco Catalyst 4500E Series 48-port 802.3af PoE, 802.3at PoEP and UPOE10/100/1000
- WS-X4748-RJ45-E: Cisco Catalyst 4500E Series, 48-port 10/100/1000 (RJ-45)
- WS-X4748-RJ45V+E: Cisco Catalyst 4500E 48-Port PoE 802.3at 10/100/1000 (RJ-45)
- WS-X4712-SFP+E: Cisco Catalyst 4500E Series 12-Port 10GbE (SFP+)
- 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 Premium PoE 10/100/1000 (RJ-45)
- WS-X4648-RJ45-E: Cisco Catalyst 4500E Series, 48-port 10/100/1000 (RJ-45)
- WS-X4640-CSFP-E: Cisco catalyst 4500E Series, 40/80 port SFP/CSFP Gigabit line card
- WS-X4606-X2-E: Cisco Catalyst 4500E Series, 6-port 10 Gigabit Ethernet (X2)
- WS-X4624-SFP-E: Cisco Catalyst 4500E Series 24-Port GE (SFP)
- WS-X4612-SFP-E: Cisco Catalyst 4500E Series 12-port GE (SFP)
- CVR-X2-SFP: Twin gigabit converter module

### Supported Cisco Catalyst 4500 Classic Line Cards and Modules

- WS-X4148-FE-BD-LC: Cisco Catalyst 4500 Fast Ethernet Switching Module, 48-port 100BASE-BX-D SMF (LC)
- WS-X4124-FX-MT: Cisco Catalyst 4000 Fast Ethernet Switching Module, 24-port 100BASE-FX (MT-RJ)
- WS-X4148-FX-MT: Cisco Catalyst 4500 Fast Ethernet Switching Module, 48-port 100BASE-FX multimode fiber (MMF)
- WS-X4124-RJ45: Cisco Catalyst 4500 10/100 Module, 24 ports (RJ-45)
- WS-X4148-RJ: Cisco Catalyst 4500 10/100 Module, 48 ports (RJ-45)
- WS-X4148-RJ21: Cisco Catalyst 4500 10/100 Module, 48-port telco (4 x RJ-21)
- WS-X4248-RJ21V: Cisco Catalyst 4500 PoE 802.3af 10/100, 48 ports (RJ-21)
- WS-X4224-RJ45V: Cisco Catalyst 4500 PoE 803.3af 10/100, 24 ports (RJ-45)
- WS-X4248-RJ45V: Cisco Catalyst 4500 PoE 802.3af 10/100, 48 ports (RJ-45)
- WS-X4248-FE-SFP: Cisco Catalyst 4500 Fast Ethernet Switching Module, 48-port 100BASE-X (SFP)
- WS-X4232-GB-RJ: Cisco Catalyst 4500 32-Port 10/100 (RJ-45), 2 Gigabit Ethernet (GBIC) modules
- WS-X4302-GB: Cisco Catalyst 4500 Gigabit Ethernet Module, 2 ports (GBIC)
- WS-X4306-GB: Cisco Catalyst 4500 Gigabit Ethernet Module, 6 ports (GBIC)
- WS-X4506-GB-T: Cisco Catalyst 4500 Gigabit Ethernet Module, 6 ports 10/100/1000 802.3af PoE or 1000BASE-X (SFP)
- 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 ports 1000BASE-X (optional SFPs)



- WS-X4424-GB-RJ45: Cisco Catalyst 4500 24-Port 10/100/1000 Module (RJ-45)
- WS-X4448-GB-RJ45: Cisco Catalyst 4500 48-Port 10/100/1000 Module (RJ-45)
- WS-X4548-GB-RJ45: Cisco Catalyst 4500 Enhanced 48-Port 10/100/1000 Module (RJ-45)
- WS-X4524-GB-RJ45V: Cisco Catalyst 4500 PoE 802.3af 10/100/1000, 24 ports (RJ-45)
- WS-X4548-GB-RJ45V: Cisco Catalyst 4500 PoE 802.3af 10/100/1000, 48 ports (RJ-45)
- WS-X4548-RJ45V+: Catalyst 4500 PoE+ Ready 10/100/1000, 48-Port (RJ-45)

## Supported Pluggables

For details about the different optical modules 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](http://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html)

## Software Requirements

The Cisco Catalyst 4500E Series Supervisor Engine 7-E is supported only in Cisco IOS Software and is not supported in the Cisco Catalyst Operating System Software. The minimum software versions are as follows:

- Supervisor Engine 7-E, Cisco IOS XE Software Release 3.1.0 SG

## Environmental Conditions

- Operating temperature: 32 to 104°F (0 to 40°C)
- Storage temperature: -40 to 167°F (-40 to 75°C)
- Relative humidity: 10 to 90 percent, noncondensing
- Operating altitude: -60 to 3000m

## Power and MTBF Information

Active Supervisor Power = 280W

Standby Supervisor Power = 224W

The above figure is not indicative of the actual power draw during operation. This is the absolute maximum value recommended for facility power and cooling capacity planning. Typical power draw is about 20% lower than the maximum value shown.

MTBF = 155,241 Hours

## Regulatory Standards Compliance

Table 5 shows regulatory standards compliance information, and Table 6 provides ordering information.

**Table 5.** Cisco Catalyst 4500 Supervisor Engine 7-E Regulatory Standards Compliance

Specification	Standard
Regulatory Compliance	CE marking
Safety	<ul style="list-style-type: none"> <li>• UL 60950CAN/CSA-C22.2 No. 60950</li> <li>• EN 60950</li> <li>• IEC 60950</li> <li>• TS 001</li> <li>• AS/NZS 3260</li> </ul>

Specification	Standard
<b>EMC</b>	<ul style="list-style-type: none"> <li>• FCC Part 15 (CFR 47) Class A</li> <li>• ICES-003 Class A</li> <li>• EN55022 Class A</li> <li>• CISPR22 Class A</li> <li>• AS/NZS 3548 Class A</li> <li>• VCCI Class A</li> <li>• ETS 300 386</li> <li>• EN 55022</li> <li>• EN 55024</li> <li>• EN 61000-6-1</li> <li>• EN 50082-1</li> <li>• EN 61000-3-2</li> <li>• EN 61000-3-3</li> </ul>
<b>Industry EMC, Safety, and Environmental Standards</b>	<ul style="list-style-type: none"> <li>• GR-63-Core Network Equipment Building Standards (NEBS) Level 3</li> <li>• GR-1089-Core Level 3</li> <li>• ETS 300 019 Storage Class 1.1</li> <li>• ETS 300 019 Transportation Class 2.3 (pending)</li> <li>• ETS 300 019 Stationary Use Class 3.1</li> <li>• ETS 300 386</li> <li>• EN 50121-4</li> </ul>
<b>ROHS Compliance</b>	ROHS5

**Table 6.** Ordering Information

Product Number	Description
<b>WS-X45-SUP7-E</b>	Cisco Catalyst 4500E Series Supervisor, 848 Gbps
<b>WS-C4510RE-S7+96V+</b>	4510R+E Chassis, Two WS-X4748-RJ-45V+E, Sup7-E
<b>S45U-31-01XO</b>	Cisco Catalyst 4500 Supervisor Engine 7-E Cisco IOS Software XE release 3.1.0 SG non-crypto universal image
<b>S45ULK9-31-01XO</b>	Cisco Catalyst 4500 Supervisor Engine 7-E Cisco IOS Software XE release 3.1.0 SG crypto universal
<b>C4500E-LB</b>	LAN BASE software license
<b>C4500E-IPB</b>	IP BASE software license
<b>C4500E-LIC=</b>	Base product ID for paper delivered software upgrade licenses
<b>C4500E-LB-IPB</b>	LAN BASE to IP BASE upgrade license (paper delivery)
<b>C4500E-LB-ES</b>	LAN BASE to Enterprise Services upgrade license (paper delivery)
<b>C4500E-IP-ES</b>	IP BASE to Enterprise Services upgrade license (paper delivery)
<b>C4500E-LIC-PAK</b>	Base product ID for paper delivered software licenses for spare Supervisor Engine 7-E
<b>C4500E-IP-ES-S</b>	IP BASE to Enterprise Services upgrade license for spare Supervisor Engine7-E (paper delivery)
<b>C4500E-IPB-S</b>	IP BASE software license for spare Supervisor Engine 7-E (paper delivery)
<b>L-C4500-LIC=</b>	Base product ID for electronically delivered software upgrade licenses
<b>L-C4500E-LB-IP</b>	LAN BASE to IP BASE upgrade license (electronically delivered)
<b>L-C4500E-IP-ES</b>	IP BASE to Enterprise Services upgrade license (electronically delivered)
<b>L-C4500E-LB-ES</b>	LAN BASE to Enterprise Services upgrade license (electronically delivered)
<b>SD-X45-2GB-E</b>	Cisco Catalyst 4500 2GB SD Memory Card for Sup 7-E
<b>USB-X45-4GB-E</b>	Cisco Catalyst 4500 4GB USB device for Sup 7-E

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## Licensing

### Software Activation Licensing

Cisco Catalyst 4500E platform with Supervisor 7-E enables software activation licensing. Each Supervisor 7-E will ship with a universal image containing all feature sets, LAN Base, IP Base, and Enterprise Services. The level of functionality is determined by the license applied.

Software activation licensing enables customers to:

- Speed deployment and roll out new Cisco software activation feature sets across customers' global networks
- Centrally and more accurately manage and track software and license compliance
- Easily conduct software compliance audits to meet regulations without affecting network operations

Operational Simplicity:

- Simplified upgrades and license transfers save time and improve productivity; you can add new capabilities simply by using a license file
- You can easily track software assets, licenses, and feature set status
- A single software image improves service delivery

Ease of Ordering:

- “Try and buy” lets you use a temporary license to try and evaluate new Cisco IOS Software functionality before purchase
- Pay-as-you-grow software key enables new features incrementally without service calls

For more information about Cisco software licensing, visit <http://www.cisco.com/go/sa>.

### Cisco Limited Lifetime Hardware Warranty

The Cisco limited lifetime hardware warranty (LLW) includes 10-day advance hardware replacement for as long as the original end user owns the product. Table 7 describes the limited lifetime hardware warranty.

Your formal warranty statement, including the warranty applicable to Cisco software, appears in the Cisco information packet that accompanies your Cisco product. We encourage you to review carefully the warranty statement shipped with your specific product before use.

For additional information on warranty terms, visit <http://www.cisco.com/go/warranty>.

Adding a Cisco technical services contract to your device coverage provides benefits not available with warranty including access to the Cisco Technical Assistance Center (TAC), a variety of hardware replacement options to meet critical business needs, updates for licensed IOS software, and registered access to the extensive Cisco.com knowledge base and support tools. Table 7 describes the benefits and features of Cisco technical services.

For information about Cisco Technical Services, go to <http://www.cisco.com/go/ts>.

**Table 7.** Limited Lifetime Hardware Warranty

Cisco Limited Lifetime Hardware Warranty <sup>1</sup>	
<b>Warranty Duration</b>	As long as the original end user continues to own or use the product except for the fan and power supply which are limited to 5 years.
<b>EoL Policy</b>	In the event of discontinuance of product manufacture, Cisco warranty support is limited to 5 years from the announcement of discontinuance.
<b>Hardware Replacement</b>	Cisco or its service center will use commercially reasonable efforts to ship a replacement part within 10 business days after receipt of the RMA request and confirmation that a replacement part is appropriate response. Actual delivery times may vary depending on customer location.
<b>Effective Date</b>	Hardware warranty commences from the date of shipment to the customer (and in case of resale by a Cisco reseller, not more than 90 days after original shipment by Cisco).
<b>TAC Support</b>	None
<b>Cisco.com Access</b>	Warranty allows guest access only to Cisco.com

<sup>1</sup> Cisco reserves the right to refund the purchase price as its exclusive warranty remedy.

## Cisco and Partner Services

Enable the innovative, secure, intelligent edge in the Borderless Network Architecture using personalized services from Cisco and our partners. Through a discovery process that begins with understanding your business objectives, we help you integrate the next-generation Cisco Catalyst 4500-E Series Switches into your architecture and incorporate network services onto that platform. Sharing knowledge and leading practices, we support your success every step of the way as you deploy, absorb, manage, and scale new technology. Choose from a flexible suite of support services designed to meet your business needs and help you maintain high-quality network performance while controlling operational costs. Table 8 shows the Cisco technical services available for Cisco Catalyst 4500-E Series Switches.

For additional information about Cisco services, visit <http://www.cisco.com/go/services>.

**Table 8.** Cisco Technical Services for Cisco Catalyst 4500-E Series Switches

Technical Services
<p><b>Cisco SMARTnet Service</b></p> <ul style="list-style-type: none"> <li>• Around-the-clock, global access to the Cisco Technical Assistance Center (TAC)</li> <li>• Unrestricted access to the extensive Cisco.com resources, communities, and tools</li> <li>• Next-business-day, 8x5x4, 24x7x4, and 24x7x2 advance hardware replacement<sup>2</sup> and onsite parts replacement and installation available</li> <li>• Ongoing operating system software updates within the licensed feature set<sup>1</sup></li> <li>• Proactive diagnostics and real-time alerts on Smart Call Home enabled devices</li> </ul>
<p><b>Cisco Smart Foundation Service</b></p> <ul style="list-style-type: none"> <li>• Next business day advance hardware replacement as available</li> <li>• Business hours access to SMB TAC (access levels vary by region)</li> <li>• Access to Cisco.com SMB knowledge base</li> <li>• Online technical resources through Smart Foundation Portal</li> <li>• Operating system software bug fixes and patches</li> </ul>
<p><b>Cisco Focused Technical Support Services</b></p> <p>3 levels of premium, high-touch services are available:</p> <ul style="list-style-type: none"> <li>• Cisco High-Touch Operations Management Service</li> <li>• Cisco High-Touch Technical Support Service</li> <li>• Cisco High-Touch Engineering Service</li> </ul> <p>Valid Cisco SMARTnet or SP Base contracts on all network equipment are required.</p>

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Footnotes:

1. Cisco operating system updates include the following: maintenance releases, minor updates, and major updates within the licensed feature set.
2. Advance hardware replacement is available in various service-level combinations. For example, 8x5xNBD indicates that shipment will be initiated during the standard 8-hour business day, 5 days a week (the generally accepted business days within the relevant region), with next business day (NBD) delivery. Where NBD is not available, same day ship is provided. Restrictions apply; please review the appropriate service descriptions for details.




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