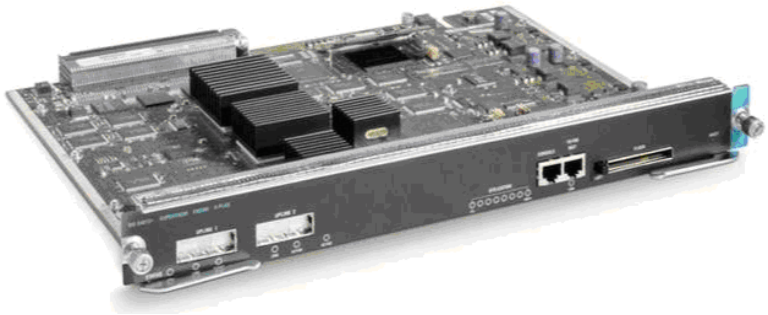
# Cisco Catalyst 4500 Series Supervisor Engine II-Plus

## Cisco Catalyst 4500 Series Supervisor Engine for Medium-Sized Enterprises and Small Branch Offices

The Cisco® Catalyst® 4500 Series Supervisor Engine II-Plus (Figure 1) integrates resiliency for advanced control of converged networks.

**Figure 1.** Cisco Catalyst 4500 Series Supervisor Engine II-Plus



## Overview

The Cisco Catalyst 4500 Series Supervisor Engine II-Plus meets the needs of value-conscious customers seeking a flexible and scalable LAN solution. Optimized for end-user connectivity for medium-sized enterprises, small enterprises, or branch offices, this supervisor engine provides the resiliency and control for converged data, voice, and video networks.

The Cisco Catalyst 4500 Series Supervisor Engine II-Plus delivers nonblocking Layer 2, 3, and 4 intelligent services to power-resilient, multilayer-switching solutions for converged data, voice, and video networks. It allows customers to deploy networkwide intelligent services, such as advanced quality of service (QoS), comprehensive security, and management with optimal control and resiliency.

Compatible with the Cisco Catalyst 4503, Cisco Catalyst 4506, Cisco Catalyst 4507R, Cisco Catalyst 4503-E, Cisco Catalyst 4506-E, and Cisco Catalyst 4507R-E/4507R+E chassis, and with Cisco Catalyst 4500 Series classic line cards, the Cisco Catalyst 4500 Series Supervisor Engine II-Plus helps to ensure an extended window of deployment of the modular Cisco Catalyst 4500 Series (refer to Table 1).

**Table 1.** Supported Chassis for Cisco Supervisor Engine II-Plus

| | Cisco Catalyst 4503 and 4503-E Chassis | Cisco Catalyst 4506 and 4506-E Chassis | Cisco Catalyst 4507R and 4507R-E/4507R+E Chassis | Cisco Catalyst 4510R and 4510R-E/4510R+E Chassis |
|---|---|---|---|---|
| **Cisco Catalyst 4500 Series Supervisor Engine II-Plus (WS-X4013+)** | Supported 28 Gbps, 21 mpps | Supported 64 Gbps, 48 mpps | Supported 64 Gbps, 48 mpps | Not supported |

### The Cisco Catalyst 4500 Series

The Cisco Catalyst 4500 Series Supervisor Engine II-Plus is optimized for wiring closets for medium-sized enterprises, education customers, or small enterprise or branch offices. In scenarios that require enhanced routing (Interior Gateway Routing Protocol [IGRP], Enhanced IGRP [EIGRP], Open Shortest Path First [OSPF], Intermediate System-to-Intermediate System [IS-IS], and Border Gateway Protocol [BGP]), NetFlow services, or higher performance and scalability, customers should consider other Layer 3-capable supervisor engines. For more information, visit: http://www.cisco.com/en/US/products/hw/switches/ps4324/products_data_sheets_list.html.

Table 2 compares the features of the Cisco Catalyst 4500 Series supervisor engines specifically for Layer 2 access.

**Table 2.** Cisco Catalyst Supervisor Engines for Layer 2 Access Only

| Feature | Supervisor Engine II-Plus-TS | Supervisor Engine II-Plus | Supervisor Engine II-Plus-10GE |
|---|---|---|---|
| **Layer 2–4 Performance** | 48 mpps and 64 Gbps | 48 mpps and 64 Gbps | 81 mpps and 108 Gbps |
| **Multilayer switching** | Basic Layer 2–4 services | Basic Layer 2–4 services | Basic Layer 2–4 services |
| **EIGRP, OSPF, IS-IS, and BGP** | No | No | No |
| **EIGRP Stub** | Yes | Yes | Yes |
| **Redundant-capable** | No | Yes | Yes |
| **CPU (MHz)** | 266 MHz | 266 MHz | 667 MHz |
| **NetFlow support** | No | No | No |
| **IP Forwarding Information Base (FIB) entries** | 32,000 | 32,000 | 32,000 |
| **Chassis support** | Cisco Catalyst 4503, 4503-E chassis | Cisco Catalyst 4503, 4506, 4507R, 4503-E, 4506-E, 4507R-E/4507R+E chassis | Cisco Catalyst 4503, 4506, 4507R, 4503-E, 4506-E, 4507R-E/4507R+E chassis |
| **QoS sharing** | Nonblocking Gigabit Ethernet (GE) only | Nonblocking GE only | All ports |
| **Broadcast suppression** | Software* | Software** | Hardware |
| **Multicast suppression** | No | No | Hardware |
| **802.1Q-in-801.1Q (QinQ)** | No | No | In hardware |
| **Active redundant supervisor engine uplinks** | No | Two 1-GE uplinks | Two 10-GE uplinks and four 1-GE uplinks |
| **Synchronous Dynamic RAM (SDRAM)** | 256 MB | 256 MB | 256 MB (512 MB optional upgrade) |
| **Onboard Flash memory** | 32 MB | 32 MB | 64 MB |
| **Active VLANs** | 2000 | 2000 | 2000 |
| **Multicast entries** | 8000 | 8000 | 8000 |
| **Spanning Tree Protocol instances** | 1500 | 1500 | 1500 |
| **Switched Virtual Interfaces (SVIs)** | 1000 | 1000 | 1000 |
| **IGMP snooping** | Yes (16,000) | Yes (16,000) | Yes (16,000) |
| **Security/QoS hardware entries** | 32,000 | 32,000 | 32,000 |
| **Policers** | 512 egress; 512 ingress | 512 egress; 512 ingress | 512 egress; 512 ingress |

* Hardware performance for nonblocking Gigabit Ethernet ports, and software performance for all other ports
** Hardware performance for nonblocking Gigabit Ethernet ports, and software performance for all other ports

### Cisco Catalyst 4500 Series Supervisor Engine II-Plus Redundancy for Business Resiliency

The Cisco Catalyst 4507R chassis has been designed with optional 1 + 1 redundant supervisor capability using the Cisco Catalyst 4500 Series Supervisor Engine II-Plus for integrated resiliency. One of these supervisor engines is designated as the primary (active) and is responsible for normal system operation; the other (secondary) serves as a standby, monitoring the operation of the primary supervisor.

Stateful Switchover (SSO) offers continuous packet forwarding during supervisor engine switchover. Information is fully synchronized between supervisors to allow the standby supervisor to immediately take over in subsecond time if the primary fails. In Service Software Upgrade (ISSU) allows customers to upgrade or downgrade complete Cisco IOS® Software images with minimal to no disruption to the network when using a redundant Cisco Catalyst 4500 Series system with dual supervisors. It enables 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 versions.

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

When the primary supervisor fails, the secondary supervisor assumes control of the chassis. This algorithm prevents oscillations between primary and secondary supervisors. Alerts are generated to the network-monitoring software if either fails. A supervisor switchover can be forced by software, or by the user through the console or with the Simple Network Management Protocol (SNMP).

### Predictable Performance and Scalability

The Cisco Catalyst 4500 Series Supervisor Engine II-Plus delivers a 64-Gbps switching fabric with a 48-million-packets-per-second (mpps) forwarding rate in hardware for Layer 2–4 traffic. Switching performance is independent of the number of route entries or advanced Layer 3 and 4 services enabled. The Cisco Catalyst 4500 Series is optimized for multimedia applications with its advanced multicast support and wire-speed switching in hardware. Protocol Independent Multicast (PIM) and Source Specific Multicast (SSM) are supported, providing end users with additional scalability to support multimedia applications.

The Cisco Catalyst 4500 Series Supervisor Engine II-Plus supports Internet Group Management Protocol (IGMP) snooping in hardware, enhancing the performance of multimedia applications and reducing network traffic by allowing a switch to dynamically add and remove hosts from a multicast group.

### Intelligent Network Services with QoS and Sophisticated Traffic Management

The Cisco Catalyst 4500 Series Supervisor Engine II-Plus offers superior per-port QoS features to help ensure that network traffic is optimally classified, prioritized, and scheduled to efficiently handle multimedia, time-sensitive (voice), and mission-critical applications. This supervisor engine can classify, police, and mark incoming packets, allowing the administrator to differentiate between traffic flows and to enforce policies based on granular QoS fields. Sharing, shaping, and strict priority configurations determine scheduling of egress traffic. This supervisor engine also supports Dynamic Buffer Limiting (DBL), a congestion-avoidance feature.

For details about the QoS features (including DBL), refer to the QoS overview at: http://www.cisco.com/en/US/products/hw/switches/ps4324/prod_white_papers_list.html.

## Comprehensive Management

The Cisco Catalyst 4500 Series Supervisor Engine II-Plus features a single console port and a single IP address to manage all features of the system. Remote in-band management is available with SNMP, Telnet client, BOOTP, and Trivial File Transfer Protocol (TFTP). Support for local or remote out-of-band management is delivered through a terminal or modem attached to the console interface. This supervisor engine delivers a comprehensive set of management tools to provide the visibility and control required in the network. The supervisor engine can be managed with CiscoWorks or Cisco Network Assistant. Cisco Catalyst switches can be configured and managed to deliver end-to-end device, VLAN, traffic, and policy management. The LAN management solution bundle offers tools such as CiscoWorks Resource Manager Essentials and CiscoView. These Web-based management tools offer numerous services, including automated inventory collection, software deployment, easy tracking of network changes, views into device availability, and quick isolation of error conditions.

## Cisco Catalyst 4500 Series Supervisor II-Plus Features

### Layer 2 Features

- Layer 2 hardware forwarding at 48 mpps
- Layer 2 switch ports and VLAN trunks
- IEEE 802. 1Q VLAN encapsulation
- Inter-Switch Link (ISL) VLAN encapsulation (excluding blocking ports on WS-X4418-GB)
- Dynamic Trunking Protocol (DTP)
- VLAN Trunking Protocol (VTP) and VTP domains
- Support for 2048 active VLANs and 4096 VLAN IDs per switch
- Spanning-tree PortFast and PortFast guard
- Spanning-tree UplinkFast and BackboneFast
- 802.1s
- 802.1w
- 802.3ad
- Spanning-tree root guard
- Cisco Discovery Protocol
- IGMP snooping v1, v2, and v3
- Cisco EtherChannel® technology, Cisco Fast EtherChannel technology, and Cisco Gigabit EtherChannel technology across line cards
- Port Aggregation Protocol (PAgP)
- Unidirectional Link Detection Protocol (UDLD) and aggressive UDLD
- Q-in-Q pass-through
- Jumbo frames (up to 9216 bytes)
- Baby giants (up to 1600 bytes)
- Unidirectional Ethernet
- Stateful switchover (S SO) in subsecond failover time
- Storm control (broadcast suppression)
- Forced 10/100 autonegotiation
- Web Content Communication Protocol (WCCP) Version 2 Layer 2 Redirect

- Private VLAN Promiscuous Trunk
- Match class of service (CoS) for non-IPv4 traffic
- L2PT over trunk port
- Class of Service (CoS) mutation
- Per-VLAN Control Traffic Intercept

**Layer 3 Features**

- Hardware-based IP Cisco Express Forwarding routing at 48 mpps
- Static IP routing
- Routing Information Protocol (RIP) and RIP2
- IGMP v1, v2, and v3
- IGMP filtering on access and trunk ports
- IP Multicast routing protocols (PIM, SSM, and Distance Vector Multicast Routing Protocol [DVMRP])
- Cisco Group Multicast Protocol (GMP) server
- Full Internet Control Message Protocol (ICMP) support
- ICMP Router Discovery Protocol
- IPv6 software switched
- EIGRP stub
- IP unnumbered for SVI
- SVI Autostate Exclude

**Sophisticated QoS and Traffic Management**

- Per-port QoS configuration
- Support for four queues per port in hardware
- Strict priority queuing
- IP differentiated services code point (DSCP) and IP Precedence
- Classification and marking based on IP type of service (ToS) or DSCP
- Classification and marking based on full Layer 3 and 4 headers (IP only)
- Input and output policing based on Layer 3 and 4 headers (IP only)
- Support for 512 policers on ingress and 512 policers on egress configured as aggregate or individual
- Shaping and sharing output queue management
- DBL (congestion-avoidance feature)
- No performance penalty for granular QoS functions
- Auto-QoS command-line interface (CLI) for VoIP deployment
- Per-port, per-VLAN QoS
- Selective Dynamic Buffer Limiting

**Predictable Performance**

- 64-Gbps switching fabric
- Layer 2 hardware forwarding at 48 mpps
- Layer 3 hardware-based IP Cisco Express Forwarding routing at 48 mpps

- Layer 4 TCP and UDP hardware-based filtering at 48 mpps
- No performance penalty with advanced Layer 3 and 4 services enabled
- Software-based learning at a sustained rate of 500 hosts per second
- Support for 32,768 MAC addresses
- Support for 32,000 entries in routing table (shared between unicast and multicast)
- Bandwidth aggregation up to 16 Gbps through Cisco Gigabit EtherChannel technology
- Hardware-based multicast management
- Hardware-based ACLs, router ACLs (RACLs), VLAN ACLs (VACLs)

**Comprehensive Management**

- Manageable through Cisco Network Assistant
- Single console port and single IP address to manage all system features
- Software configuration management, including local and remote storage
- Manageable through CiscoWorks Windows network-management software on a per-port and per-switch basis, providing a common management interface for Cisco routers, switches, and hubs
- SNMPv1, v2, and v3 instrumentation, delivering comprehensive in-band management
- CLI-based management console to provide detailed out-of-band management
- Remote Monitoring (RMON) software agent to support four RMON groups (history, statistics, alarms, and events) for enhanced traffic management, monitoring, and analysis
- Support for all nine RMON groups through the use of a Cisco SwitchProbe® analyzer (Switched Port Analyzer [SPAN]) port, which permits traffic monitoring of a single port, a group of ports, or the entire switch from a single network analyzer or RMON probe
- Analysis support, including ingress port, egress port, and VLAN SPAN
- Layer 2 traceroute
- Remote SPAN (RSPAN)
- Cisco SmartPort macros
- SPAN ACL filtering
- SPAN CPU port
- Dynamic Host Configuration Protocol (DHCP) client autoconfiguration
- Enhanced SNMP MIB support
- HTTPS
- Time Domain Reflectometry (TDR)
- MAC Address Notification

**Advanced Security**

- TACACS+ and RADIUS, which help enable centralized control of the switch and restrict unauthorized users from altering the configuration
- Standard and extended ACLs on all ports
- 802.1x user authentication (with VLAN assignment, voice VLAN, port security, guest VLAN, private guest VLAN, private VLAN, and RADIUS Supplied Session Timeout extensions)
- 802.1x accounting
- 802.1x authentication failure

- 802.1x Private VLAN assignment
- 802.1x Private Guest VLAN
- 802.1x RADIUS-supplied time out
- NAC Layer 2 802.1x
- NAC Layer 2 IP
- Trusted boundary
- Router ACLs (RACLs) on all ports (no performance penalty)
- VLAN ACLs (VACLs)
- Port ACLs (PACLs)
- Private VLANs (PVLANs) on access and trunk ports
- DHCP snooping
- DHCP Option 82
- DHCP Option 82 insertion
- DHCP Option 82 Pass Through
- Port security
- Sticky port security
- SSHv1 and SSHv2
- VLAN Management Policy Server (VMPS) client
- Unicast MAC filtering
- Unicast port flood blocking
- Dynamic Address Resolution Protocol (ARP) inspection
- IP source guard
- Community Private VLANs
- Trunk Port Security
- 802.1x Inaccessible Authentication Bypass
- MAC Authentication Bypass
- Control Plane Policing
- 802.1x Unidirectional Controlled Port
- Voice VLAN Sticky Port Security
- Secure Copy Protocol (SCP)
- EtherChannel Trunk Port security
- IP Source Guard for Static Hosts
- IEEE 802.1x Multi Domain Authentication

**High Availability**

- Stateful Switchover (SSO)
- In Service Software Upgrade (ISSU)
- SSO in subsecond failover time
- Hot Standby Router Protocol (HSRP)
- SSO-Aware HSRP

- Virtual Router Redundancy Protocol (VRRP)
- Cisco Generic Online Diagnostics (GOLD)

**Hardware Requirements**

- Redundant supervisor engines must match (a Cisco Catalyst 4500 Series Supervisor Engine II-Plus, IV, or V cannot be mixed in the same Cisco Catalyst 4507R chassis, for example).
- The Cisco Catalyst 4500 Series Supervisor Engine II-Plus is not supported in a Cisco Catalyst 4510R chassis; the Supervisor Engine V is required as a minimum for the Cisco Catalyst 4510R.

## Technical Specifications

**Cisco Catalyst 4500 Series Supervisor Engine II-Plus Performance and Switching Specifications**

- 64-Gbps nonblocking switch fabric
- 48-mpps Layer 2 forwarding (hardware)
- 48-mpps Layer 3 and 4 forwarding, Cisco Express Forwarding-based (hardware)
- Layers 2, 3, and 4 hardware-based switch engine (ASIC-based)
- Centralized design
- Unicast and multicast routing entries: 32,000
- Layer 2 multicast addresses: 16,384
- MAC addresses: 32,768
- VLANs: 2048 active VLANs
- Per-VLAN Spanning Tree Plus (PVST+) and Per-VLAN Rapid Spanning Tree Protocol (PVRST)
- Uplinks: Dual 1000-Mbps Gigabit Ethernet (gigabit interface converter [GBIC])

**Traffic and Congestion Management**

- Number of queues: four queues per port
- Type of buffers: dynamic

**Switch Architecture Specifications**

- Store-and-forward switching
- Functionally transparent line-card architecture
- Packet buffering: dynamic, 16 MB shared memory

**Management**

- CiscoWorks LAN Management Solution (LMS), including Cisco Works Resource Manager Essentials
- CiscoView
- Cisco Network Assistant
- BGP4-MIB.my
- BRIDGE-MIB.my (RFC 1493)
- CISCO-BULK-FILE-MIB.my
- CISCO-CDP-MIB.my
- CISCO-CLASS-BASED-QOS-MIB.my
- CISCO-CONFIG-COPY-MIB.my

- CISCO-CONFIG-MAN-MIB.my
- CISCO-ENTITY-ASSET-MIB.my
- CISCO-ENTITY-EXT-MIB.my
- CISCO-ENTITY-FRU-CONTROL-MIB.my
- CISCO-ENTITY-SENSOR-MIB.my
- CISCO-ENTITY-VENDORTYPE-OID-MIB.my
- CISCO-ENVMON-MIB.my
- CISCO-FLASH-MIB.my
- CISCO-FTP-CLIENT-MIB.my
- CISCO-HSRP-MIB.my
- CISCO-IETF-IP-MIB.my
- CISCO-IETF-IP-FORWARD-MIB.my
- CISCO-IETF-ISIS-MIB.my
- CISCO-IF-EXTENSION-MIB.my
- CISCO-IGMP-FILTER-MIB.my
- CISCO-IMAGE-MIB.my
- CISCO-IPMROUTE-MIB.my
- CISCO-L2-TUNNEL-CONFIG-MIB.my
- CISCO-L2L3-INTERFACE-CONFIG-MIB.my
- CISCO-LAG-MIB.my
- CISCO-MEMORY-POOL-MIB.my
- CISCO-NDE-MIB.my
- CISCO-PAGP-MIB.my
- CISCO-PAE-MIB.my
- CISCO-PING-MIB.my
- CISCO-PORT-SECURITY-MIB.my
- CISCO-PORT-STORM-CONTROL-MIB.my
- CISCO-PRIVATE-VLAN-MIB.my
- CISCO PROCESS MIB.my
- CISCO-PRODUCTS-MIB.my
- CISCO-RF-MIB.my
- CISCO-RMON-CONFIG-MIB.my
- CISCO-RTTMON-MIB.my
- CISCO-STP-EXTENSIONS-MIB.my
- CISCO-SYSLOG-MIB.my
- CISCO-VLAN-IFTABLE-RELATIONSHIP-MIB.my
- CISCO-VLAN-MEMBERSHIP-MIB.my
- CISCO-VTP-MIB.my
- DOT3-MAU-MIB.my (RFC 3636)

- ENTITY-MIB.my
- ETHERLIKE-MIB.my
- EXPRESSION-MIB.my
- HC-RMON-MIB.my
- IEEE8021-PAE-MIB.my
- IEEE8023-LAG-MIB.my (802.3ad)
- IF-MIB.my
- IGMP-MIB.my
- IPMROUTE-MIB.my
- NOVELL-IPX-MIB.my
- NOVELL-RIPSAP-MIB.my
- OLD-CISCO-TS-MIB.my
- PIM-MIB.my
- RFC1213-MIB.my (MIB-II)
- RFC1243-MIB.my (APPLETALK MIB)
- RFC1253-MIB.my (OSPF-MIB)
- RMON-MIB.my (RFC 1757)
- RMON2-MIB.my (RFC 2021)
- SMON-MIB.my (Internet-Draft)
- SNMP-FRAMEWORK-MIB.my (RFC 2571)
- SNMP-MPD-MIB.my (RFC 2572)
- SNMP-NOTIFICATION-MIB.my (RFC 2573)
- SNMP-TARGET-MIB.my (RFC 2573)
- SNMP-USM-MIB.my (RFC 2574)
- SNMP-VACM-MIB.my (RFC 2575)
- SNMPv2-MIB.my
- TCP-MIB.my
- UDP-MIB.my
- RIP SNMP MIB

**Industry Standards**

- Ethernet: IEEE 802.3, 10BASE-T
- Fast Ethernet: IEEE 802.3u, 100BASE-TX, 100BASE-FX
- Gigabit Ethernet: IEEE 802.3z, 802.3ab
- IEEE 802.3af Power over Ethernet (PoE)
- IEEE 802. 1D Spanning Tree Protocol
- IEEE 802.1w rapid reconfiguration of spanning tree
- IEEE 802. 1s multiple VLAN instances of spanning tree
- IEEE 802.3 ad Link Aggregation Control Protocol (LACP)
- IEEE 802. 1p class-of-service (CoS) prioritization

- IEEE 802.1Q VLAN
- IEEE 802. 1x user authentication
- 1000BASE-X (GBIC)
- 1000BASE-X (Small Form-Factor Pluggable [SFP])
- 1000BASE-SX
- 1000BASE-LX/LH
- 1000BASE-ZX
- RMON I and II standards

**Supported Cisco Catalyst 4500 Series Classic Line Cards**

- 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)
- (MT-RJ)
- 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) module
- 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)

**Optics Support**

The two GBIC ports directly on the Cisco Catalyst 4500 Series Supervisor II-Plus module support the following GBIC media types:

- WS-G5483: Cisco 1000BASE-T GBIC
- WS-G5484: Cisco 1000BASE-SX Short-Wavelength GBIC (multimode only)

- WS-G5486: Cisco 1000BASE-LX/LH Long-Haul GBIC (single-mode or multimode)

- WS-G5487: Cisco 1000BASE-ZX Extended-Reach GBIC (single-mode)
- Cisco coarse wavelength-division multiplexing (CWDM) GBIC solution

### Software Requirements

The minimum software version is Cisco IOS Software Release 12.2(25)SG or later for the Cisco Catalyst 4503 and Cisco Catalyst 4506 chassis. The minimum software version is Cisco IOS Software Release 12.2(37)SG or later for the Cisco Catalyst 4503-E and Cisco Catalyst 4506-E chassis. The minimum software version is Cisco IOS Software Release 12.2(40)SG or later for the Cisco Catalyst 4507R and Cisco Catalyst 4510R chassis.

### Indicator and Port Specifications

- System status: Green (operational)/red (faulty)
- Switch usage load: 1 to 100 percent aggregate switching usage
- Console: RJ-45 female
- Reset (switch recessed protected)
- Uplinks: Link and active
- Image management port: 10/100BASE-TX (RJ-45 female) data terminal equipment (DTE); green (good), orange (disabled), off (not connected)

### Environmental Conditions

- Operating temperature: 32 to 104ºF (0 to 40ºC)
- Storage temperature: –40 to 167ºF (–40 to 75ºC)
- Relative humidity: 10 to 90 percent, noncondensing
- Operating altitude: –60 to 2000m regulatory standards compliance (refer to Table 3 for details)

**Table 3.** Cisco Catalyst 4500 Series Supervisor Engine II-Plus Regulatory Standards Compliance Details

| Specification | Standard |
|---|---|
| **Regulatory Compliance** | CE marking |
| **Safety** | • UL 60950<br>• CAN/CSA-C22.2 No. 60950<br>• EN 60950<br>• IEC 60950<br>• TS 001<br>• AS/NZS 3260 |
| **EMC** | • FCC Part 15 (CFR 47) Class A<br>• ICES-003 Class A<br>• EN55022 Class A<br>• CISPR22 Class A<br>• AS/NZS 3548 Class A<br>• VCCI Class A<br>• EN 55022<br>• EN 55024<br>• EN 61000-6-1<br>• EN 50082-1<br>• EN 61000-3-2<br>• EN 61000-3-3<br>• ETS 300 386 |

| Specification | Standard |
|---|---|
| **Industry EMC, Safety, and Environmental Standards** | • GR-63-Core Network Equipment Building Standards (NEBS) Level 3<br>• GR-1089-Core Level 3<br>• ETS 300 019 Storage Class 1.1<br>• ETS 300 019 Transportation Class 2.3 (pending)<br>• ETS 300 019 Stationary Use Class 3.1<br>• ETS 300 386 |

Table 4 gives ordering information for the Cisco Catalyst 4500 Series Supervisor Engine II-Plus.

**Table 4.** Ordering Information for Cisco Catalyst 4500 Series Supervisor Engine II-Plus

| Product Number | Description |
|---|---|
| **WS-X4013+(=)** | Cisco Catalyst 4500 Supervisor Engine II-Plus, 2 Gigabit Ethernet, console RJ-45 (Cisco IOS Software-based) |
| **WS-X4013+/2** | Cisco Catalyst 4500 Redundant Supervisor Engine II-Plus, 2 Gigabit Ethernet, console RJ-45 (Cisco IOS Software based) |
| **S45IPB-12231SG** | Cisco IOS Software for the Cisco Catalyst 4500 Series (IP Base image with EIGRP-stub support) |
| **S45IPBK9-12231SG** | Cisco IOS Software for the Cisco Catalyst 4500 Series (IP Base image with Triple Data Encryption Standard [3DES] and EIGRP-stub support) |
| **MEM-C4K-FLD64M** | Cisco IOS Software for Cisco Catalyst 4500-Based Supervisor, compact Flash memory, 64 MB option |
| **MEM-C4K-FLD128M** | Cisco IOS Software for Cisco Catalyst 4500-Based Supervisor, compact Flash memory, 128 MB option |

## Warranty

Cisco Catalyst 4500 E-Series and Cisco Catalyst 4500 switches are covered by the Cisco Limited Lifetime Hardware Warranty. For more information, see this document on Cisco.com: http://www.cisco.com/en/US/docs/general/warranty/English/LH2DEN__.html.

**Note:** If you purchased the Cisco Catalyst 4500 Series Supervisor Engine II-Plus before May 1, 2009, it is covered by the Cisco 90-Day Limited Hardware Warranty. For more information, see this document on Cisco.com: http://www.cisco.com/en/US/docs/general/warranty/English/901DEN__.html.

## Cisco Technical Support Services

Cisco Technical Support Services help to ensure that your Cisco products operate efficiently, remain highly available, and benefit from current system software to assist you in effectively managing your network service while controlling operational costs.

Cisco Technical Support Services provide significant benefits that go beyond what is offered under the Cisco warranty policy. Services available under a Cisco SMARTnet® service contract that are not covered under a warranty include the following (also refer to Tables 5 and 6):

- Latest software updates
- Rapid replacement of hardware in next-day, 4-hour, or 2-hour dispatch options
- Ongoing technical support through the Cisco Technical Assistance Center (TAC)
- Registered access to http://www.cisco.com/

**Table 5.** Cisco Technical Support Services: Components

| Service Feature Overview | Benefit or Advantage |
|---|---|
| **Software Support** | Software support offers maintenance and minor and major updates for licensed feature sets. Downloading new maintenance releases, patches, or updates of Cisco IOS Software helps to enhance and extend the useful life of Cisco devices. Through major software updates, it is possible to extend the life of equipment and maximize application technology investments by:<br>• Increasing the performance of current functions<br>• Adding new functions that, in many cases, require no additional hardware investment<br>• Enhancing network or application availability, reliability, and stability |
| **Cisco TAC Support** | With more than 1000 highly trained customer support engineers, 390 CCIE® experts, and access to 13,000 research and development engineers, Cisco TAC complements your in-house staff with a high level of knowledge in data, voice, and video communications networking technology. Its sophisticated call-routing system quickly routes calls to the correct technology personnel. The Cisco TAC is available 24 hours a day, 365 days a year. |
| **Cisco.com** | This award-winning Website provides 24-hour access to an extensive collection of online product and technology information, interactive network management and troubleshooting tools, and knowledge transfer resources that can help customers reduce costs by increasing staff self-sufficiency and productivity. |
| **Advance Hardware Replacement** | Advance Replacement and onsite field engineer options supply fast access to replacement hardware and field resources for installing hardware, minimizing the risk of potential network downtime. |

**Table 6.** Cisco Technical Support Services: Competitive Differentiators

| Feature | Benefit or Advantage |
|---|---|
| **Worldwide Virtual Lab** | This extensive lab of Cisco equipment and Cisco IOS Software versions provides an invaluable engineering resource and knowledge base for training, product information, and recreation and testing of selected network issues to help decrease time to resolution. |
| **Cisco TAC Training**<br>• Boot camps<br>• Technical calls<br>• Technical forums | Cisco is committed to providing customers the latest in technology support. These Cisco TAC training programs assist customers in case avoidance as well as providing knowledge transfer of Cisco networking expertise. |
| **Cisco Live** | This powerful suite of Internet-enabled tools with firewall-friendly features are secure, encrypted Java applets that can turn a simple phone call into an interactive collaboration session, allowing a customer and Cisco TAC support engineer to work together more effectively. |
| **Global Logistics** | With 10,000 onsite field engineers and a $2.3 billion investment in inventory, Cisco delivers award-winning, worldwide hardware replacement support from 650 depots, covering 120 countries. |
| **Cisco IOS Software** | Cisco IOS Software employs 100 discrete technologies with over 2000 features. Each year 400 new features are added. This software is installed in more than 10 million devices and is running on more than 10,000 networks worldwide. It operates on the world's largest IPv6 and VoIP networks and in all major service provider networks worldwide. |

## For More Information

For information about Cisco Catalyst 4500 Series line cards, chassis, and other supervisor engines, refer to the Cisco Catalyst 4500 Series data sheet at: http://www.cisco.com/go/catalyst4500.

For additional information about Cisco products, contact:

- United States and Canada: (800) 553-NETS (6387)
- Europe: 32 2 778 4242
- Australia: 612 9935 4107
- Other: 408-526-7209
- http://www.cisco.com

**Note:** Version 1.6 (shipping since December 2000) and later supported

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV
Amsterdam, The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.



Printed in USA C78-339516-05 08/10