Cisco Catalyst 4500 Series Supervisor Engine II-Plus-10GE

Cisco Catalyst 4500 Series Supervisor Engine for Medium-Sized Enterprises and Service Providers

The Cisco® Catalyst® 4500 Series Supervisor Engine II-Plus-10GE (Figure 1) complements the Catalyst 4500 Series Supervisor Engine portfolio by delivering 10 Gigabit Ethernet capability in an enhanced Layer 2 supervisor engine. The Supervisor Engine II-Plus-10GE is equipped with both gigabit (Small Form-Factor Pluggable [SFP]) ports and line-rate 10 Gigabit Ethernet (X2) ports, allowing for an easy and cost-efficient migration to 10 Gigabit Ethernet.

Figure 1. Cisco Catalyst 4500 Series Supervisor Engine II-Plus-10GE

Overview

The Cisco Catalyst 4500 Series Supervisor Engine II-Plus-10GE is a 10 Gigabit Ethernet supervisor engine running Cisco IOS® Software that meets the needs of value-conscious enterprise and service provider customers. This supervisor engine has been optimized for high-performance enterprise wiring closets and service provider access and aggregation needs. Medium-sized enterprises, education customers, small and medium-sized businesses (SMBs), and service providers can all benefit from the supervisor engine's resilience and intelligent control of converged data, voice, and video networks.

The Supervisor Engine II-Plus-10GE delivers nonblocking Layer 2–4 intelligent services to help enable power-resilient, enhanced Layer 2 switching solutions for converged 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. Scalability of these intelligent network services is made possible with dedicated, specialized resources known as ternary content addressable memory (TCAM). Ample TCAM resources (32,000 entries) enable "high feature capacity," which provides wire-speed routing/switching performance with concurrent provisioning of services such as QoS and security. This helps ensure scalability for today's network requirements with ample room for future growth.

The Supervisor Engine II-Plus-10GE can be used with the Cisco Catalyst 4503, Catalyst 4506, and Catalyst 4507R chassis, and with classic Cisco Catalyst 4500 Series line cards. The Supervisor Engine II-Plus-10GE is also compatible with the Cisco Catalyst 4503-E, Catalyst 4506-E, and Catalyst 4507R-E chassis, helping to ensure an extended window of deployment of the modular Cisco Catalyst 4500 Series (Table 1).

Table 1. Supported Chassis for Cisco Catalyst 4500 Series Supervisor Engine II-Plus-10GE

	Cisco Catalyst 4503/4503-E Chassis	Cisco Catalyst 4506/4506-E Chassis	Cisco Catalyst 4507R/4507R-E Chassis	Cisco Catalyst 4510R/4510R-E Chassis
Cisco Catalyst 4500 Series Supervisor Engine II-Plus-10GE	Supports 72 Gbps and 54 million packets per second (mpps)	Supports 108 Gbps and 81 mpps	Supports 108 Gbps and 81 mpps	Not supported

Redundancy for Business Resiliency

The Cisco Catalyst 4507R and Catalyst 4507R-E chassis have been designed with optional 1+1 redundant supervisor engine capability using dual Supervisor Engine II-Plus-10GE's 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 engine.

Stateful Switchover (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. 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 Catalyst 4500 Series system with dual supervisor engines. ISSU 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 releases.

SSO and ISSU dramatically improve the network reliability and availability in a Layer 2 environment. SSO and ISSU are essential for business-critical applications such as voice over IP (VoIP), preventing VoIP calls from being dropped.

The redundancy scheme using the Supervisor Engine II-Plus-10GE in the Cisco Catalyst 4507R and Catalyst 4507R-E is identical to that used by other Cisco Catalyst 4500 Series Supervisor Engines. When the primary supervisor engine fails, the secondary supervisor engine assumes control of the chassis. This algorithm prevents oscillation between primary and secondary supervisor engines. Alerts are generated to the network-monitoring software if either fails. A supervisor engine 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 Supervisor Engine II-Plus-10GE delivers a 108-Gbps switching fabric with line-rate forwarding of 81 mpps in hardware for Layer 2–4 traffic. Switching performance is independent of the number of route entries or advanced security features enabled. The Supervisor Engine II-Plus-10GE 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 Supervisor Engine II-Plus-10GE 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.

Integrated Cisco IoS Software Switching Solution

The Supervisor Engine II-Plus-10GE supports Cisco IOS Software, providing operational ease of use by allowing customers to deploy a single network operating system across their routed and switched infrastructures.

Industry-leading Cisco IOS Software integrates features for scalability, bandwidth management, security services, network resiliency, and manageability into the Cisco Catalyst 4500 Series. Cisco IOS Software provides investment protection and tight coupling of Layer 2–4 services into a single, unified configuration file and system image. The Supervisor Engine II-Plus-10GE is an enhanced Layer 2 switching solution with support for advanced security and QoS features (the enhanced Layer 3 feature set is not supported).

Intelligent Network Services with QoS and Sophisticated Traffic Management

The Supervisor Engine II-Plus-10GE 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 Configuration Guide at: http://www.cisco.com/en/US/products/sw/iosswrel/ps1839/products_feature_guide09186a00807fcf4b.html.

Comprehensive Management

The Supervisor Engine II-Plus-10GE features a single console port and a single IP address to manage all system features. 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. These tools include CiscoWorks and Cisco Network Assistant, which can be used to manage and configure Cisco Catalyst switches to deliver end-to-end device, VLAN, traffic, and policy management. The CiscoWorks LAN Management Solution (LMS) 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.

Advanced Security

The Cisco Catalyst 4500 Series offers a rich set of industry-leading, integrated security features to proactively lock down your critical network infrastructure. It reduces network security risks with a rich set of Network Admission Control (NAC) capabilities and 802.1x-based user authentication, authorization, and accounting (AAA). The security policy enforcement is uncompromised with the

wire-rate, dedicated access control lists (ACLs) to fend off ever-increasing virus and security attacks. The Cisco Catalyst 4500 Series offers powerful, easy-to-use tools to effectively prevent untraceable man-in-the-middle attacks, control plane resource exhaustion, IP spoofing, and flooding attacks, without any change to the end-user or host configurations. Secure remote access, file transfers, and network management are accomplished with the Secure Shell (SSH) Protocol Versions 1 and 2, Secure Copy Protocol (SCP), and SNMPv3, respectively.

Network Admission Control

Network Admission Control (NAC) is a foundational component of the Cisco Self-Defending Network strategy, improving the network's ability to automatically identify, prevent, and respond to security threats. NAC enables the Cisco Catalyst switches to collaborate with third-party solutions for security-policy compliance and enforcement before a host is permitted to access the network.

NAC performs posture validation at the Layer 2 network edge for hosts with or without 802.1x enabled. Vulnerable and noncompliant hosts can be isolated, given reduced network access, or directed to remediation servers based on organizational policy. By ensuring that every host complies with security policy, organizations can significantly reduce the damage caused by infected hosts. NAC is available through standard software upgrades or Cisco SMARTnet® contracts on Cisco Catalyst switches.

Support for Dynamic Address Resolution Protocol Inspection

Because it is relatively easy for a malicious user to manipulate Address Resolution Protocol (ARP) tables of other hosts on the same VLAN, the Supervisor Engine II-Plus-10GE supports Dynamic ARP Inspection (DAI). In a typical attack, a malicious user can send unsolicited ARP replies (gratuitous ARP packets) to other hosts on the subnet with the attacker's MAC address and the default gateway IP address. Such ARP table manipulation leads to various man-in-the-middle attacks, posing a security threat in the network. DAI intercepts all ARP requests and replies on the untrusted ports. Each intercepted packet is verified for valid IP-to-MAC bindings. DAI helps prevent the man in-the-middle attacks by not relaying invalid ARP replies out to other ports in the same VLAN. It is a solution with no change to the end-user or host configurations.

Feature Differences Among Catalyst 4500 Series Enhanced Layer 2 Supervisor Engines

The Cisco Catalyst 4500 Series Supervisor Engine II-Plus-10GE is optimized for LAN access for medium-sized enterprises, education customers, or small enterprise or branch offices. The Supervisor Engine II-Plus-10GE provides these customers with the highest levels of performance among the Catalyst 4500 Series enhanced Layer 2 supervisor engines. Table 2 provides a feature comparison.

Table 2. Comparison of Cisco Catalyst 4500 Series Enhanced Layer 2 Supervisor Engines

Feature	Cisco Catalyst 4500 Series Supervisor Engine II-Plus-TS	Cisco Catalyst 4500 Series Supervisor Engine II-Plus	Cisco Catalyst 4500 Series Supervisor 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 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 and 4503-E Switches chassis	Cisco Catalyst 4503, 4506, 4507R, 4503-E, 4506-E, and 4507-E Switches chassis	Cisco Catalyst 4503, 4506, 4507R, 4503-E, 4506-E, and 4507-E Switches chassis
Quality-of-Service (QoS) Sharing	Nonblocking Gigabit Ethernet only	Nonblocking Gigabit Ethernet only	All ports
Broadcast Suppression	Software[1]	Software[2]	Hardware
Multicast Suppression	No	No	Hardware
802.1Q-in-801.1Q (Q-in-Q)	No	No	In hardware
Active Redundant Supervisor Engine Uplinks	No	2 Gigabit Ethernet uplinks	Two 10 Gigabit Ethernet uplinks and four Gigabit Ethernet 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 Virtual LANs (VLANs)	2000	2000	2000
Multicast Entries	8000	8000	8000
Spanning Tree Protocol Instances	1500	1500	1500
Switched Virtual Interfaces (SVIs)	1000	1000	1000
Internet Group Management Protocol (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

When customers require enhanced routing capabilities (such as Enhanced Interior Gateway Routing Protocol [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 the Cisco Catalyst 4500 Series Supervisor Engine IV, V, or V-10G. These supervisor engines are optimized for the higher-density enterprise LAN, medium-sized enterprise branch-office backbone, or Layer 3 distribution points. The Supervisor Engines V and V-10GE support additional Ethernet ports for even higher-density applications, scaling up to 136 Gbps. The Supervisor Engines IV, V, and V-10GE deliver nonblocking Layer 2–4 switching with enhanced Layer 3 and 4 services and routing (EIGRP, OSPF, IS-IS, and BGP) to power-resilient, intelligent multilayer switching solutions for converged data, voice, and video networks. For more information, please refer to the data sheets for the Catalyst 4500 Series Supervisor Engines IV, V, and V-10GE: http://www.cisco.com/en/US/products/hw/switches/ps4324/products_data_sheets_list.html.

Customers who require the highest levels of performance and scalability in addition to enhanced routing capabilities should consider the Cisco Catalyst 4500 Series Supervisor Engine 6-E. The Supervisor Engine 6-E with CenterFlex technology is an intelligent, high-performance, next-generation extension to the Catalyst 4500 Series and is optimized for customers deploying business-critical applications. CenterFlex technology is enabled by Cisco developed application-specific integrated circuits (ASICs) specific to the Supervisor Engine 6-E that deliver industry-leading centralized performance and configuration flexibility. CenterFlex technology enables

[1] Hardware performance for nonblocking Gigabit Ethernet ports, and software performance for all other ports.
[2] Hardware performance for nonblocking Gigabit Ethernet ports, and software performance for all other ports.

granular optimization of real-time voice, video, and data communications to help boost workforce productivity, profitability, and customer success for organizations of all sizes. The Supervisor Engine 6-E delivers 320 Gbps of switching capacity with Layer 2 and Layer 3 forwarding performance of 250 mpps. For more information, please refer to the data sheet at: http://www.cisco.com/en/US/products/hw/switches/ps4324/products_data_sheets_list.html.

Cisco Catalyst 4500 Series Supervisor II-Plus-10GE Features at A Glance

Layer 2 Features

- Layer 2 hardware forwarding at 81 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
- QinQ in hardware
- 802.1Q-in-801.1Q (QinQ)
- Jumbo frames (up to 9216 bytes)
- Baby giants (up to 1600 bytes)
- Unidirectional Ethernet
- SSO in subsecond failover time
- Web Cache Communication Protocol (WCCP) Version 2 Layer 2 Redirect
- Private VLAN Promiscuous Trunk
- Match class of service (CoS) for non-IPv4 traffic
- Layer 2 Tunneling Protocol (L2TP) over trunk port
- CoS mutation
- Per-VLAN Control Traffic Intercept

Layer 3 Features

- Hardware-based IP Cisco Express Forwarding routing at 81 mpps
- Static IP routing
- Routing Information Protocol (RIP) and RIP2
- EIGRP-Stub
- 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 support for Internet Control Message Protocol (ICMP)
- ICMP Router Discovery Protocol
- IPv6 software switched
- 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
- Selective Dynamic Buffer Limiting

Predictable Performance

- 108-Gbps switching fabric
- Layer 2 hardware forwarding at 81 mpps
- Layer 3 hardware-based IP Cisco Express Forwarding routing at 81 mpps
- Layer 4 TCP/UDP hardware-based filtering at 81 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 32,000 MAC addresses
- Support for 32,000 entries in routing table (shared between unicast and multicast)

- Bandwidth aggregation up to 40 Gbps through Cisco Gigabit EtherChannel technology
- Hardware-based multicast management
- Hardware-based ACLs

Comprehensive Management

- Cisco Network Assistant support
- Single console port and single IP address to manage all system features
- Software configuration management, including local and remote storage
- Optional compact Flash memory card to store software images for backup and easy software upgrades
- 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 trace route
- MAC Address Notification
- Remote SPAN (RSPAN)
  - SPAN ACL filtering
  - Dynamic Host Configuration Protocol (DHCP) client auto configuration
  - Enhanced SNMP MIB support

Advanced Security

- TACACS+ and RADIUS, which 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 and guest VLAN extensions)
- 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 and Option 82 insertion
- Port security
- SSHv1 and SSHv2
- VLAN Management Policy Server (VMPS) client

- Unicast MAC filtering
- Unicast port flood blocking
- Dynamic ARP inspection
- IP source guard
- Community private VLAN
- Network Admission Control
- 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
- Storm control (formally known as broadcast and multicast suppression)
- IEEE 802.1x Multi Domain Authentication
- IP Source Guard for Static Hosts

High Availability:

- Stateful Switchover (SSO)
- In Service Software Upgrade (ISSU)
- SSO in subsecond failover time
- Hot Standby Router Protocol (HSRP)
- SSO-Aware Hot Standby Router Protocol
- Virtual Router Redundancy Protocol (VRRP)
- Cisco Generic Online Diagnostics (GOLD)
- VSS Client

Software Requirements

The minimum software versions are as follows:

- Cisco IOS Software Release 12.2(25)SG or later

Hardware Requirements

- Redundant supervisor engines must match (a Cisco Catalyst 4500 Series Supervisor Engine II-Plus, II-Plus-10GE, IV, or V cannot be mixed in the same Cisco Catalyst 4507R chassis, for example).
- The Supervisor Engine II-Plus-10GE is not supported in a Cisco Catalyst 4510R or 4510R-E chassis; the Supervisor Engine V , V-10GE and Supervisor 6-E are required as a minimum for the Cisco Catalyst 4510R or 4510R-E chassis.

Technical Specifications

Performance and switching specifications:

- 108 Gbps nonblocking switch fabric

- 81-mpps Layer 2 forwarding (hardware)
- 81-mpps Layer 3 and 4 forwarding, Cisco Express Forwarding-based (hardware)
- Layers 2–4 hardware-based switch engine (application-specific integrated circuit [ASIC]-based)
- Centralized design
- Unicast and multicast routing entries: 32,000
- Layer 2 multicast addresses: 16,384
- MAC addresses: 32,000
- VLANs: 2048 active VLANs
- Per-VLAN Spanning Tree Plus (PVST+) and Per-VLAN Rapid Spanning Tree Protocol (PVRST)
- Uplinks: Dual 10-Gigabit Ethernet (10-GE interface converter [X2]) and four 1-Gigabit Ethernet (1-GE SFP interface converter)

Traffic and Congestion Management

- Number of queues: Four queues per port
- Type of buffers: Dynamic
- Switch Architecture Specifications
- Store-and-forward switching, fast 1.4 microsecond latency
- Functionally transparent line-card architecture
- Packet buffering: Dynamic, 16 MB shared memory

Management

- CiscoWorks LMS, including CiscoWorks Resource Manager Essentials
- CiscoView
- SNMPv1, v2, and v3
- RMON I and II
- RFC 1213-MIB (MIB II)
- UDP-MIB
- TCP-MIB
- CISCO-FLASH-MIB
- CISCO-IMAGE-MIB
- RFC 2233 (IF-MIB)
- CISCO-CONFIG-MAN-MIB
- CISCO-MEMORY-POOL
- CISCO-CDP-MIB
- RMON-MIB lite (RFC 1757)
- RMON2-MIB lite (RFC 2021)
- HC-RMON-MIB
- SMON-MIB
- ENTITY-MIB (V1-RFC 2037) (V2- RFC 2737)

- CISCO-PROCESS-MIB
- CISCO-CONFIG-COPY-MIB
- CISCO-ENTITY-EXT-MIB
- CISCO-ENTITY-ASSET-MIB
- CISCO-ENTITY-FRU-CONTROL-MIB
- CISCO-ENTITY-SENSOR-MIB
- CISCO-ENVMON-MIB
- BRIDGE-MIB (RFC 1493)
- CISCO-PAGP-MIB
- CISCO-PRIVATE-VLAN-MIB
- CISCO-STP-EXTENSIONS-MIB
- CISCO-VLAN-MEMBERSHIP-MIB
- CISCO-VLAN-IFTABLE-RELATIONSHIP-MIB
- IGMP-MIB
- PIM-MIB
- OSPF-MIB
- CISCO-ENTITY-VENDORTYPE-OID-MIB
- CISCO-SYSLOG-MIB
- CISCO-BULK-FILE-MIB
- CISCO-CLASS-BASED-QOS-MIB
- CISCO-FTP-CLIENT-MIB
- CISCO-HSRP-MIB
- CISCO-IGMP-FILTER-MIB
- CISCO-IPMROUTE-MIB
- CISCO Port-SECURITY-MIB
- CISCO-RMON-CONFIG-MIB
- CISCO-VTP-MIB
- ETHERLIKE-MIB
- EXPRESSION-MIB
- CISCO Port-STORM-CONTROL-MIB

Industry Standards

- Ethernet: IEEE 802.3, 10BASE-T
- Fast Ethernet: IEEE 802.3u, 100BASE-TX, and 100BASE-FX
- Gigabit Ethernet: IEEE 802.3z, 802.3ab
- 10 Gigabit Ethernet: IEEE 802.3ae
- 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 (gigabit interface converter [GBIC])
- 1000BASE-X (SFP)
- 1000BASE-SX
- 1000BASE-LX/LH
- 1000BASE-ZX
- RMON I and II standards

Supported 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)
- (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 (RJ45)
- GLC-T – 1000BASE-T SFP
- GLC-SX-MM – Gigabit Ethernet SFP, LC connector, SX transceiver
- GLC-LH-SM – Gigabit Ethernet SFP, LC connector, LX/LH transceiver
- GLC-ZX-SM – 1000BASE-ZX SFP
- Cisco coarse wavelength-division multiplexing (CWDM) GBIC solution
- Cisco (CWDM) SFP solution
- X2-10GE-LR – 10GBASE-LR X2 Module
- X2-10GE-CX4 – 10GBASE-CX4 X2 Module
- X2-10GE-LX4 – 10GBASE-LX4 X2 Module
- X2-10GE-SR – 10GBASE-SR X2 Module
- X2-10GE-ER – 10GBASE-ER X2 Module
- X2-10GE-LRM – 10GBASE-LRM X2 Module

Software Requirements

The Cisco Catalyst 4500 Series Supervisor Engine II-Plus-10GE is supported only in Cisco IOS Software. The minimum software version is Cisco IOS Software Release 12.2(25)SG or later.

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: 10/100/1000BASE-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 2000 m regulatory standards compliance (refer to Table 3 for details)

Table 3. Cisco Catalyst 4500 Series Supervisor Engine II-Plus-10GE Regulatory Standards Compliance Details

Specification	Standard
Regulatory Compliance	CE marking
Safety	• UL 60950 • CAN/CSA-C22.2 No. 60950 • EN 60950 • IEC 60950 • TS 001 • AS/NZS 3260

EMC	• FCC Part 15 (CFR 47) Class A • ICES-003 Class A • EN55022 Class A • CISPR22 Class A • AS/NZS 3548 Class A • VCCI Class A • EN 55022 • EN 55024 • EN 61000-6-1 • EN 50082-1 • EN 61000-3-2 • EN 61000-3-3 • ETS 300 386
Industry EMC, Safety, and Environmental Standards	• GR-63-Core Network Equipment Building Standards (NEBS) Level 3 • GR-1089-Core Level 3 • ETS 300 019 Storage Class 1.1 • ETS 300 019 Transportation Class 2.3 (pending) • ETS 300 019 Stationary Use Class 3.1 • ETS 300 386

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

Table 4. Ordering Information

Product Number	Description
WS-X4013+10GE(=)	Cisco Catalyst 4500 Supervisor Engine II-Plus, 2 Gigabit Ethernet, console RJ-45 (Cisco IOS Software-based)
WS-X4013+10GE/2	Cisco Catalyst 4500 Redundant Supervisor Engine II-Plus, 2 Gigabit Ethernet, console RJ-45 (Cisco IOS Software-based)
S4KL3-12231SG	Cisco IOS Software for Cisco Catalyst 4500 Series Supervisor Engine II-Plus and IV; basic Layer 3 software image (RIP, static routes, IPX, AppleTalk)
S4KL3K2-12231SG	Cisco IOS Software for Cisco Catalyst 4500 Series Supervisor Engine II-Plus; basic Layer 3 software image, Triple Data Encryption Standard (3DES), (RIP, static routes, IPX, AppleTalk)
MEM-C4K-FLD64M	Cisco IOS Software for Cisco Catalyst 4500 Series-based supervisor engine, Compact Flash memory, 64 MB option
MEM-C4K-FLD128M	Cisco IOS Software for Cisco Catalyst 4500 Series-based supervisor engine, Compact Flash memory, 128 MB option
MEM-C4K-256-SDRAM=	256 MB SDRAM, spare
MEM-C4K-U512D-SDRAM	512 MB SDRAM factory upgrade
MEM-C4K-512D-SDRAM=	512 MB SDRAM, spare

Warranty

The warranty for the Cisco Catalyst 4500 Series Supervisor Engine II-Plus-10GE is 90 days; it includes hardware replacement with a 10 day turnaround from receipt of a return materials authorization (RMA).

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	Benefits or Advantages
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: • Increasing the performance of current functions • Adding new functions that, in many cases, require no additional hardware investment • 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	Benefits or Advantages
Worldwide Virtual Lab	This extensive lab of Cisco equipment and Cisco IOS Software releases 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 • Boot camps • Technical calls • 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 US$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 more than 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

To learn more about how you can take advantage of Cisco Technical Support Services, talk to your Cisco representative or visit Cisco Technical Support Services at: http://www.cisco.com/en/US/products/svcs/ps3034/serv_category_home.html.

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

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