Cisco Catalyst **4000** Family Supervisor Engine IV

**Cisco Catalyst 4500 Series integrates resiliency for advanced control of converged networks.**

Overview

The Cisco Catalyst® 4000 Family Supervisor Engine IV integrates nonblocking Layer 2/3/4 switching with integrated resiliency, further enhancing control of converged networks. Converged voice/video/data networks with high availability enable business resiliency for enterprise and metropolitan (metro) Ethernet customers deploying Internet-based business applications. As a key component of Cisco AVVID (Architecture for Voice, Video and Integrated Data), the Cisco Catalyst 4000 Family extends control from the backbone to the network edge with intelligent network services, including sophisticated quality of service (QoS), predictable performance, advanced security, comprehensive management, and integrated resiliency with Supervisor Engine IV. The modular architecture, media

flexibility, and expandability of the Cisco Catalyst 4000 Family enable an extended window of deployment in converged networks. This reduces the cost of ownership by minimizing recurring operational expenses, thus improving return on investment (ROI).

The Cisco Catalyst Supervisor Engine IV delivers next-generation switching technology with proven Cisco IOS® Software to power scalable, intelligent multilayer switching solutions for converged voice, video, and data networks. Optimized for the enterprise wiring closet, branch-office backbones, or Layer 3 distribution points, the Cisco Catalyst Supervisor Engine IV provides the performance and scalability to handle today's and tomorrow's network applications. Compatible with the widely deployed Cisco Catalyst 4006 chassis, the new Cisco Catalyst 4500 Series chassis, and existing Cisco Catalyst 4000 Series switching line cards, Supervisor Engine IV ensures an extended window of deployment to further strengthen the scalability of the modular Cisco Catalyst 4000 Family.

Figure 1
Cisco Catalyst 4000 Family Supervisor Engine IV
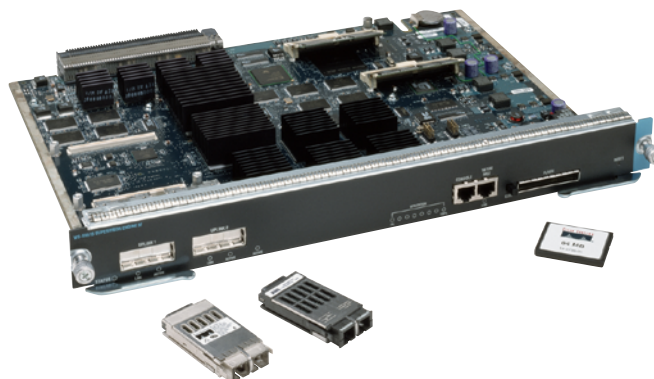
Key Differences Between Supervisor Engines III and IV

The Cisco Catalyst 4000 Family Supervisor Engines III and IV have a number of key differences. Key differences are outlined in Table 1.

Table 1 Key Differences Between Supervisor Engines III and IV

Attribute	Supervisor Engine III	Supervisor Engine IV
Platform support	Cisco Catalyst 4006, 4503, and 4506	Cisco Catalyst 4006, 4503, 4506, and 4507R
Redundant capable	No	Yes (Cisco Catalyst 4507R only)
Minimum software requirement	Cisco IOS 12.1(8a)EW or higher	Cisco IOS 12.1(12c)EW or higher
CPU	300 MHz	333 MHz
Memory speed (synchronous dynamic RAM [SDRAM])	100 MHz	133 MHz
SDRAM	256 MB	512 MB
Upgradable to NetFlow services card (future)[1]	No	Yes

1. The NetFlow services card for Supervisor Engine IV is an add-on daughter card that is designed to extend the feature functionality of the base engine by including hardware support for flow-based and virtual LAN (VLAN)-based statistics collection.

Supervisor Engine III can be deployed in the Cisco Catalyst 4006, 4503, and 4506 in single-chassis non-redundant mode only. Supervisor Engine IV can be deployed in single-chassis non-redundant mode in the Cisco Catalyst 4006, 4503, and 4506 and 4507R. It can be deployed in single-chassis redundant mode as an option in the Cisco Catalyst 4507R chassis (slots 1 and 2 only).

Supervisor Engine IV Redundancy for Business Resiliency

The Cisco Catalyst 4507R chassis has been designed with an optional 1 + 1 redundant supervisor capability using the Supervisor Engine IV for integrated resiliency. One Supervisor Engine IV is designated as the primary (active) and is responsible for normal system operation. The other (secondary) can serve as a standby, monitoring the operation of the primary supervisor.

The redundancy scheme using Supervisor Engine IV in the Cisco Catalyst 4507R is similar to the Cisco Catalyst 6500. When the primary supervisor fails, the secondary supervisor assumes control of the chassis. The algorithm is designed to prevent oscillations between primary and secondary supervisors. Alerts are generated to the network monitoring software if either fails. In addition, the supervisor design allows the hot-swapping of supervisor boards without disrupting system operation. A switchover of the supervisor can be forced by software, or by the user via console or the Simple Network Management Protocol (SNMP).

Predictable Performance and Scalability

The Cisco Catalyst 4000 Supervisor Engine IV delivers a 64-Gbps switching fabric with 48-Mpps forwarding rate in hardware for both Layer 2 and Layer 3/4 traffic. Switching performance is independent of the number of route entries or advanced Layer 3 services enabled. Hardware-based Cisco Express Forwarding routing architecture allows for increased scalability and performance. Cisco Express Forwarding architecture allows for very high-speed lookups while also ensuring the stability and scalability necessary to meet the needs of future requirements.

The Cisco Catalyst 4000 with Supervisor Engine IV is a platform optimized for multimedia applications with its advanced multicast support. Supervisor Engine IV 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. Protocol Independent Multicast (PIM), Source-Specific Multicast (SSM), and a Cisco Group Management Protocol server are also supported in hardware, providing end users with additional scalability to support multimedia applications.

Integrated Cisco IOS Switching Solution

The Cisco Catalyst 4000 Supervisor Engine IV natively supports Cisco IOS Software, enabling a single Cisco IOS configuration and software image for multilayer switching. It combines the features of the Cisco Catalyst 2950, 3550, 4000, 5500, and 6500 Series switches with Cisco IOS Software to create a single, integrated operating system that performs all switching and routing functions. It also provides 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 4000 platform. Cisco IOS Software on the Cisco Catalyst 4000 Family provides investment protection and tight coupling of Layer 2/3/4 services into a single, unified configuration file and system image. The Cisco Catalyst 4000 Supervisor Engine IV defaults to Layer 2 switching upon startup and may be configured to perform Layer 3 and 4 switching and routing services as desired.

Intelligent Network Services with QoS and Sophisticated Traffic Management

The Cisco Catalyst 4000 Supervisor Engine IV offers superior per-port QoS features to ensure that network traffic is classified, prioritized, and scheduled in an optimal way to efficiently handle bandwidth-hungry multimedia, time-sensitive (voice), and mission-critical applications. The Cisco Catalyst 4000 Supervisor Engine IV can classify, reclassify, police, and mark incoming packets, allowing the administrator to differentiate between traffic flows and enforce policies based on granular QoS fields. Scheduling of egress traffic is determined by sharing, shaping, and strict priority configurations.

For a detailed overview of the QoS features in Supervisor Engine IV, refer to the Supervisor Engine IV QoS overview at the following URL:

http://www.cisco.com/warp/public/cc/pd/si/casi/ca4500/prodlit/Sup4_QOS_WP

Comprehensive Management

The Cisco Catalyst 4000 Supervisor Engine IV features a single console port and single IP address to manage all features of the system. This is yet another benefit of an integrated Layer 2/3/4 switching architecture. Remote in-band management is available via SNMP, Telnet client, Bootstrap Protocol (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.

The Cisco Catalyst 4000 Supervisor Engine IV delivers a comprehensive set of management tools to provide the required visibility and control in the network. Managed with CiscoWorks solutions, Cisco Catalyst Family 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 and Resource Manager Essentials and Cisco View. These Web-based management tools offer a variety of 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 4000 Supervisor Engine IV supports TACACS+, Remote Access Dial-In User Service (RADIUS), and 802.1x for user authentication. RADIUS, TACACS+, and 802.1x enable the Cisco Catalyst 4000 to deliver tremendous flexibility and choice to organizations that require authentication, authorization, and accounting (AAA) functionality.

The Cisco Catalyst 4000 Supervisor Engine IV also offers a rich blend of network traffic security capabilities. It can perform hardware-based filtering based on access lists used to define security policies. Packets can be filtered based on source and destination IP addresses, or TCP/User Datagram Protocol (UDP) ports; therefore, users can be restricted from sensitive portions of the network. All access-control-list (ACL) lookups are done in hardware; therefore, forwarding and routing performance are not affected when enabling ACL-based security in the network.

Key Features at a Glance

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 and WS-X4412-2GB-T)
- Dynamic Trunking Protocol (DTP)
- VLAN Trunking Protocol (VTP) and VTP domains
- Support for 4096 VLANs per switch
- Per-VLAN spanning tree (PVST) and PVST+
- Spanning-tree PortFast and PortFast guard
- Spanning-tree UplinkFast and BackboneFast
- 802.1s
- 802.1w
- Spanning-tree root guard
- Cisco Discovery Protocol
- IGMP snooping v1 and v2
- Cisco EtherChannel®, Fast EtherChannel, and Gigabit EtherChannel technology across line cards
- Port Aggregation Protocol (PAgP)
- Unidirectional link detection (UDLD) and aggressive UDLD
- QinQ pass-through

Layer 3 Features

- Hardware-based IP Cisco Express Forwarding routing at 48 Mpps
- Static IP routing
- IP routing protocols (Interior Gateway Routing Protocol [IGRP], Enhanced IGRP [EIGRP], Open Shortest Path First [OSPF], Routing Information Protocol [RIP], RIP2)
- Border Gateway Protocol Version 4 (BGP4) and Multicast Border Gateway Protocol (MBGP)
- Hot Standby Router Protocol (HSRP)

- Software routing of Internetwork Packet Exchange (IPX) and AppleTalk
- IGMP v1, v2, and v3
- IGMP filtering on access and trunk ports
- IP multicast routing protocols (PIM, SSM, Distance Vector Multicast Routing Protocol [DVMRP])
- Multicast Source Discovery Protocol (MSDP)
- Cisco Group Multicast Protocol (GMP) server
- Full Internet Control Message Protocol (ICMP) support
- ICMP Router Discovery Protocol

Sophisticated QoS and Traffic Management
- Per-port QoS configuration
- Support for four queues per port in hardware
- Strict priority queuing
- IP differentiated service 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 3/4 headers (IP only)
- Input and output policing based on Layer 3/4 headers (IP only)
- Support for 1024 policers on ingress and 1024 policers on egress configured as aggregate or individual
- Shaping and sharing output queue management
- No performance penalty for granular QoS functionality

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/UDP) hardware-based filtering at 48 Mpps
- No performance penalty with advanced Layer 3/4 services enabled
- Software-based learning at a sustained rate of 1000 hosts per second
- Support for 32,768 Media Access Control (MAC) addresses
- Support for 131,072 entries in routing table (shared between unicast and multicast)
- Scalability to 2000 virtual ports (VLAN port instances)
- Bandwidth aggregation up to 16 Gbps through Cisco Gigabit EtherChannel technology
- Hardware-based multicast management
- Hardware-based ACLs
- Baby Giants (up to 1600 bytes)

Comprehensive Management
- Single console port and single IP address to manage all features of the system
- 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
- SNMP v1, v2, and v3 instrumentation, delivering comprehensive in-band management
- Command-line interface (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 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

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
- Router ACLs (RACLs) on all ports (no performance penalty)
- VLAN ACLs (VACLs)
- Private VLANs (PVLANs) on access and trunk ports
- Dynamic Host Configuration Protocol (DHCP) snooping and Option82 insertion

Supervisor Engine IV Specific Features
- Route processor redundancy (RPR) (sub-minute failover time)
- Upgradable to NetFlow services card (future)

Key Differences Between Cisco Catalyst Supervisor Engines II, III, and IV

Table 2 gives the key differences between the Cisco Catalyst Supervisor Engines II, III, and IV.

Table 2 Key Differences Between Cisco Catalyst Supervisor Engines II, III, and IV

Attribute	Supervisor Engine II	Supervisor Engine III	Supervisor Engine IV
Platform support	Cisco Catalyst 4006, 4503, and 4506	Cisco Catalyst 4006, 4503, and 4506	Cisco Catalyst 4006, 4503, 4506, and 4507R
Redundant capable	No	No	Yes (Cisco Catalyst 4507R only)
Performance	24 Gbps, 18 Mpps (Layer 2 only)	64 Gbps, 48 Mpps (Cisco Express Forwarding based) (Layer 2/3/4)	64 Gbps, 48 Mpps (Cisco Express Forwarding based) (Layer 2/3/4)
Multilayer switching	Layer 2	Integrated Layer 2/3/4	Integrated Layer 2/3/4
Operating system	Cisco Catalyst Operating System (CatOS)	Cisco IOS Software	Cisco IOS Software
QoS	System-based QoS • Classification • Scheduling	Port-based QoS (advanced features) • Classification • Scheduling • Marking • Bandwidth management • ACLs	Port-based QoS (advanced features) • Classification • Scheduling • Marking • Bandwidth management • ACLs
Upgradable to NetFlow services card (future)	No	No	Yes
Onboard memory	• Packet memory: Shared (dynamically allocated) 8 MB per engine • Nonvolatile RAM (NVRAM): 1 MB • Flash memory: 16 MB • SDRAM: 64 MB	• Packet memory: Shared (dynamically allocated) 16 MB • NVRAM: 512 kB • Onboard Flash memory: 64 MB (in addition to removable compact Flash memory) • SDRAM: 256 MB	• Packet memory: Shared (dynamically allocated) 16 MB • NVRAM: 512 kB • Onboard Flash memory: 64 MB (in addition to removable compact Flash memory) • SDRAM: 512 MB
Compact Flash memory	No removable compact Flash memory	Removable compact Flash memory (64 or 128 MB)	Removable compact Flash memory (64 or 128 MB)
Media Access Control (MAC) addresses	16,384	32,768	32,768
Queues per port	2	4	4
Architecture	Three 24-Gbps switching engines	One 64-Gbps switching engine	One 64-Gbps switching engine
CPU	CPU: 150 MHz	CPU: 300 MHz	CPU: 333 MHz
Memory speed	74 MHz	100 MHz	133 MHz

Technical Specifications

Supervisor Engine IV Performance and Switching Specifications

- 64-Gbps nonblocking switch fabric
- 48-Mpps Layer 2 Forwarding (hardware)
- 48-Mpps Layer 3/4 Forwarding—IP routing, Cisco Express Forwarding based (hardware)
- Layer 2, Layer 3, and Layer 4 hardware-based switch engine (application-specific integrated circuit [ASIC] based)
- Centralized design

- Unicast and multicast routing entries: 131,072
- Layer 2 multicast addresses: 16,384
- MAC addresses: 32,768
- VLANs: 4096 supported in hardware
- PVST: Yes
- Uplinks: Dual 1000-Mbps Gigabit Ethernet (gigabit interface converter [GBIC])

Traffic/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

CPU and Memory Specifications

Table 3 lists CPU and memory specifications for Supervisor Engine IV.

Table 3 CPU and Memory Specifications for Supervisor Engine IV

Specification	Supervisor Engine IV
CPU	333-MHz CPU
SDRAM memory	512 MB
SDRAM speed	133 MHz
NVRAM memory	512 kB
Onboard Flash memory	64 MB
Removable CompactFlash memory	64 MB or 128 MB available from Cisco

Management

- CiscoWorks/LAN Management Solutions (LMS); includes Cisco Works Resource Manager Essentials and Cisco view
- SNMP v1, 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

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 802.1D Spanning-Tree Protocol
- IEEE 802.1w rapid reconfiguration of spanning tree
- IEEE 802.1s multiple VLAN instances of spanning tree
- 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 Line Cards and Modules

- WS-X4148-FX-MT—Cisco Catalyst 4000 Fast Ethernet Switching Module, 48-port 100BASE-FX multimode fiber (MMF) (MT-RJ)
- WS-X4148-RJ—Cisco Catalyst 4000 10/100 Module, 48 ports (RJ-45)
- WS-X4148-RJ21—Cisco Catalyst 4000 10/100 Module, 48-port telco (4 x RJ-21)
- WS-X4148-RJ45V—Cisco Catalyst 4000 Inline Power 10/100, 48 ports (RJ-45)
- WS-X4232-GB-RJ—Cisco Catalyst 4000 32-port 10/100 (RJ-45), 2-Gigabit Ethernet (GBIC) Module

- WS-X4232-RJ-XX—Cisco Catalyst 4000 Layer 3 Services 32-port 10/100 (RJ-45), plus modular uplink slot

- WS-X4424-GB-RJ45—Cisco Catalyst 4000 24-port 10/100/1000 Module (RJ-45)

- WS-X4306-GB—Cisco Catalyst 4000 Gigabit Ethernet Module, 6 ports (GBIC)

- WS-X4412-2GB-T—Cisco Catalyst 4000 Gigabit Ethernet Module, 12-port 1000BASE-T(RJ-45) + 2-port 1000BASE-X (GBIC)

- WS-X4418-GB—Cisco Catalyst 4000 Gigabit Ethernet Module, server switching 18 ports (GBIC)

- WS-X4448-GB-LX—Cisco Catalyst 4000 48-port 1000BASE-LX (SFP)

- WS-X4448-GB-RJ45—Cisco Catalyst 4000 48-port 10/100/1000 Module (RJ-45)

- WS-U4504-FX-MT—Cisco Catalyst 4000 Fast Ethernet Uplink Daughter Card, 4-port 100BASE-FX (MT-RJ)

- WS-X4604-GWY[1]—Cisco Catalyst 4000 Access Gateway Module with IP/firewall software

- WS-X4095-PEM—Cisco Catalyst 4006 DC Power Entry Module

- WS-X4124-FX-MT[2]—Cisco Catalyst 4000 Fast Ethernet Switching Module, 24-port 100BASE-FX (MT-RJ)

- WS-G5483[1]—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

Indicator and Port Specifications

- System status: Green (operational)/red (faulty)

- Switch utilization 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)

1. Supported in future software release
2. Version 1.6 (shipping since December 2000) and higher supported

Software Requirements

The Cisco Catalyst Supervisor Engine IV is supported only in Cisco IOS Software and is not supported in Cisco CatOS. The minimum software versions are as follows:

- Supervisor Engine IV   12.1(12c)EW or higher

Power Requirements

Power consumption: 100W (Cisco Catalyst Supervisor Engine IV)

Environmental Conditions

- Operating temperature: 32º to 104ºF (0º to 40ºC)

- Storage temperature: –40º to 167ºF (–40º to 75ºC)

- Relative humidity: 10 to 90%, noncondensing

- Operating altitude: –60 to 4000m

Regulatory Standards Compliance

Table 4 gives regulatory standards compliance details for the Cisco Catalyst Supervisor Engine IV.

Table 4 Cisco Catalyst Supervisor Engine IV 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 Systems (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

Ordering Information

Table 5 lists ordering information for the Cisco Catalyst Supervisor Engine III and IV.

Table 5 Cisco Catalyst Supervisor Engine III and IV Ordering Information

Product Number	Description
WS-X4515	Cisco Catalyst 4000 Supervisor Engine IV
WS-X4515/2	Cisco Catalyst 4507R Redundant Supervisor Engine IV
S4KL3-12112EW	Cisco IOS Software for the Cisco Catalyst 4000 Supervisor Engines III and IV; basic Layer 3 software image (RIP, static routes, IPX, AppleTalk)
S4KL3E-12112EW	Cisco IOS Software for the Cisco Catalyst 4000 Supervisor Engines III and IV; enhanced Layer 3 software image, including OSPF, IGRP, and EIGRP
MEM-C4K-FLD64M	Cisco Catalyst 4000 Supervisor Engine III and IV CompactFlash memory, 64-MB option
MEM-C4K-FLD128M	Cisco Catalyst 4000 Supervisor Engine III and IV CompactFlash memory, 128-MB option

Licensing

Use of RMON on the Cisco Catalyst 4006 and 4500 Series switches requires the purchase of the RMON agent license. Use of BGP4 on Supervisor Engines III and IV requires an InterDomain routing license. Only one RMON agent license or InterDomain routing license is required per chassis.

Product Number	Description
WS-C4006-EMS-LIC(=)	Cisco Catalyst 4006 RMON Agent license
WS-C4503-EMS-LIC(=)	Cisco Catalyst 4503 RMON Agent license
WS-C4506-EMS-LIC(=)	Cisco Catalyst 4506 RMON Agent license
WS-C4507R-EMS-LIC(=)	Cisco Catalyst 4507R RMON Agent license
FR-IRC4	Cisco Catalyst 4000 Supervisor Engine III and IV InterDomain Routing Feature license (BGP4)

Warranty

The warranty for the Supervisor Engine IV is 90 days; it includes hardware replacement with a 10-day turnaround from return to manufacturer authorization (RMA).

Service and Support

Cisco Systems is committed to maximizing the total cost your network investment. Cisco offers a portfolio of Technical Support Services to ensure that your Cisco products operate efficiently, remain highly available, and benefit from the most up-to-date system software. The Technical Support Services includes Cisco Smartnet Support and Software Application Services. For more information visit the Technical Assistance Center website: http://www.cisco.com/tac/

For additional information on the Cisco Catalyst 4000 Series, visit:

http://www.cisco.com/warp/public/cc/pd/si/casi/ca4000/.

For information on Cisco Catalyst 4000 Series line cards, chassis, and other supervisor engines, refer to the Cisco Catalyst 4000 Series data sheet at:

http://www.cisco.com/warp/public/cc/pd/si/casi/ca4000/prodlit/c4000_ds.htm.

For additional information on Cisco products, contact:

United States and Canada: 800 553-NETS (6387)

Europe: 32 2 778 4242

Australia: 612 9935 4107

Other: 408 526-7209

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