Cisco IOS Software Release 12.2(40)SG for Cisco Catalyst 4500 Series Supervisor Engines

PB403891

Overview

This product bulletin describes the hardware and software features supported by Cisco IOS® Software Release 12.2(40)SG for the Cisco® Catalyst® 4500 Series Supervisor Engine II-Plus, Cisco Catalyst 4500 Series Supervisor Engine II-Plus-TS, Cisco Catalyst 4500 Series Supervisor Engine II-Plus-10GE, Cisco Catalyst 4000/4500 Supervisor Engine IV, Cisco Catalyst 4000/4500 Supervisor Engine V, Cisco Catalyst 4500 Series Supervisor Engine V-10GE, and Cisco Catalyst 4500 Series Supervisor Engine 6-E. Cisco IOS Software Release 12.2(40)SG is also the first release that supports the new Cisco Catalyst 4500 E-Series featuring the new revolutionary CenterFlex technology.

Primary Release Message

The new Cisco IOS Software Release 12.2(40)SG is for all shipping Cisco Catalyst 4500 Series supervisor engines. This new release works with the new CenterFlex technology to enable granular optimization of voice, video, and data communications, delivering high centralized performance, flexibility, high availability, operational simplicity, and investment protection. The Cisco IOS Software Release 12.2(40)SG thus maximizes performance, enhances the end-user experience, and offers unprecedented control and flexibility over hardware resources.

Support for New E-Series Hardware

In addition to the classic line cards and supervisor engines, Cisco IOS Software Release 12.2(40)SG supports the next-generation high-performance E-Series Supervisor Engine 6-E with CenterFlex technology and E-Series line cards and chassis. A brief list of primary E-Series hardware supported by Cisco IOS Software Release 12.2.(40)SG is shown in Table 1.

Table 1. Supported E-Series Hardware

Product Number	Description
WS-C4503-E	Cisco Catalyst 4500 E-Series 3-Slot Chassis, fan, no ps
WS-C4506-E	Cisco Catalyst 4500 E-Series 6-Slot Chassis, fan, no ps
WS-C4507R-E	Cisco Catalyst 4500 E-Series 7-Slot Chassis, fan, no ps, Red Sup Capable
WS-C4510R-E	Cisco Catalyst 4500 E-Series 10-Slot Chassis, fan, no ps, Red Sup Capable
WS-X45-Sup6-E	Cisco Catalyst 4500 E-Series Sup 6-E, 2x10GE(X2) w/ TwinGig
WS-X4648-RJ45V-E	Cisco Catalyst 4500 E-Series 48-Port PoE 802.3af 10/100/1000(RJ45)
WS-X4648-RJ45V+E	Cisco Catalyst 4500 E-Series 48-Port Premium PoE 10/100/1000
WS-X4606-X2-E	Cisco Catalyst 4500 E-Series 6-Port 10GbE (X2)

For more information about the Cisco Catalyst 4500-E Series hardware, see: http://www.cisco.com/en/US/products/hw/switches/ps4324/prod_bulletins_list.html.

New Software Features

The following new features of the Cisco IOS Software Release 12.2(40)SG are applicable only for the new Supervisor Engine 6-E, unless otherwise stated.

Dynamic Multi-Protocol Ternary Content Addressable Memory (TCAM)

The ternary content addressable memory 4 (TCAM4) is an architectural innovation that enables wire-speed forwarding performance in the new Supervisor Engine 6-E. Dynamic multi-protocol TCAM is a feature of the TCAM4 that enables wire-speed forwarding performance for IPv4, IPv6, unicast Reverse Path Forwarding (uRPF), and multicast (both IPv4 and IPv6) routes, while optimizing memory resources.

Customers who deploy a mix of IPv4 and IPv6 features in their network will benefit from the increased capacity and performance resulting from DMPT optimization. With the new dynamic multi-protocol TCAM, small number of IPv6 routes will not adversely affect the number of IPv4 routing entries. Lastly, Cisco IOS Software Release 12.2(40)SG automatically handles DMPT optimization, allowing for greater simplicity and ease of management.

Service-Aware Resource Allocation

Wire-speed security and quality-of-service (QoS) services are enabled by the TCAM4 on the new Supervisor Engine 6-E. With the previous generation of TCAMs, half of the TCAM memory space was strictly allocated for security features, with the other half allocated for QoS features. With the new TCAM4 Service Aware Resource Allocation (SARA) feature, this strict half-and-half allocation is eliminated. This allows the customer to have the ultimate flexibility of deploying service features at wire speed. For customers who exclusively use either one of the service features (security or QoS), this represents an almost twofold increase in the capacity of the classification entries. As above, Cisco IOS Software Release 12.2(40)SG automatically allocates the TCAM4 memory space for security or QoS services, resulting in simple and easy configuration of the switch.

uRPF Strict Mode

The uRPF feature mitigates problems caused by the introduction of malformed or forged (spoofed) IP source addresses into a network by discarding IP packets that lack a verifiable IP source address. uRPF deflects denial-of-service (DoS) and distributed denial-of-service (DDoS) attacks by forwarding only packets that have source addresses that are valid and consistent with the IP routing table. This helps to protect the network of the customer, the ISP, and the rest of the Internet. When using uRPF in strict mode, the packet must be received on the interface that the router would use to forward the return packet. uRPF strict mode is supported for both IPv4 and IPv6 prefixes.

IPv6 Forwarding in Hardware

IPv6 is the next-generation IP protocol, designed to solve numerous problems that the original IP version 4 has, such as address space limitations. Cisco IOS Software Release 12.2(40)SG supports hardware-based IPv6 unicast and multicast forwarding. The primary IPv6 features supported in hardware are:

- IPv6 Cisco Express Forwarding
- IPv6 hardware support for forwarding unicast and multicast traffic
- IPv6 PIM Sparse Mode

- Standard and extended ACLs
- IPv6 uRPF Strict Mode

IPv6 Forwarding in hardware is only supported on the Supervisor Engine 6-E.

For more information about Cisco IPv6 features, see http://www.cisco.com/ipv6.

Enhanced Interior Gateway Routing Protocol IPv6 Support

Customers can configure Enhanced Interior Gateway Routing Protocol (EIGRP) to route IPv6 prefixes. EIGRP configuration and protocol behavior for both IPv4 and IPv6 prefixes are similar, providing operational familiarity and continuity. EIGRP support for IPv6 will enable customers to use their existing EIGRP knowledge and processes, allowing them to deploy an IPv6 network at a low cost.

IPv6 Multicast Listener Discovery and Multicast Listener Discovery Snooping

Multicast Listener Discovery (MLD) is a protocol used by IPv6 multicast devices to discover the presence of multicast listeners (nodes wishing to receive IPv6 multicast packets) on its directly attached links and to discover which multicast packets are of interest to neighboring nodes. MLD snooping is supported in two different versions: MLD v1 and MLD v2. Network switches use MLD snooping to limit the flood of multicast traffic, causing IPv6 multicast data to be selectively forwarded to a list of ports that want to receive the data, instead of being flooded to all ports in a VLAN. This lessens the load on devices in the network, minimizing unnecessary bandwidth on links, enabling efficient distribution of IPv6 multicast data.

Gateway Load Balancing Protocol

The Gateway Load Balancing Protocol (GLBP) feature provides automatic router backup for IP hosts configured with a single default gateway on a LAN. Multiple first hop routers on the LAN combine to offer a single virtual first hop IP router while sharing the IP packet forwarding load. GLBP devices share packet-forwarding responsibilities, optimizing resource usage, thereby reducing costs. Other routers on the LAN may act as redundant GLBP routers that will become active if any of the existing forwarding routers fail. This improves the resiliency of the network and reduces administrative burden. GLBP is a feature that is applicable for the Supervisor Engine 6-E and the classic supervisor engines.

Support for TwinGig Converter Module

The Cisco TwinGig converter module offers investment protection for 10 Gigabit Ethernet switches, converting a 10 Gigabit Ethernet X2 interface into two Gigabit Ethernet Small Form-Factor Pluggable (SFP) ports. In this way, customers can initially use the switch with Gigabit Ethernet uplinks and later implement 10 Gigabit Ethernet uplinks as business demands change. The Supervisor Engine 6-E supports the TwinGig converter module.

Robust and Flexible File Management System (FAT File System)

The FAT file system is widely used to manage files on devices disks and flash. The support of the FAT file system allows one to easily remove, add, and/or transfer images to and from the flash.

Storm Control: Per-Port Multicast Suppression

A storm event occurs when a large number of broadcast and/or multicast packets inundate a network to degrade its overall performance, preventing control packets from being forwarded. The storm control feature detects and reacts to such an event so that forwarding of data and control packets is not affected. This is achieved by monitoring the number of packets received on a port. If this count exceeds a configured threshold, the feature takes action to control the flood of packets. Cisco IOS Software Release 12.2(40)SG allows suppression of broadcast and multicast traffic on a per-port basis.

Cisco Modular QoS Command-Line-Interface

Cisco Modular QoS CLI (MQC) is the framework used to implement Cisco IOS Software QoS. MQC allows the user to define a traffic class, create a traffic policy (containing the QoS feature to be applied to the traffic class), and attach the traffic policy to an interface. MQC is a cross-Cisco[[NOTE: Per Cisco style, Cisco cannot be combined with another term using a hyphen, slash, or other connector. Please rephrase “cross-Cisco.”]] baseline that provides a consistent syntax and behavior of QoS features across multiple product families. Cisco IOS Software Release 12.2(40)SG complies to MQC for configuration of QoS features on the Supervisor Engine 6-E. MQC enables rapid deployment of new features and technology innovations and facilitates the management of network performance with respect to bandwidth, delay, jitter, and packet loss, enhancing the performance of mission-critical business applications. The rich and advanced QoS features that are supported as part of the Supervisor Engine 6-E are enabled using Cisco MQC.

Two-Rate Three-Color Policing

The Two-Rate Three-Color Policing feature limits the input or output transmission rate of a class of traffic based on user-defined criteria and marks or colors packets by setting the applicable differentiated services code point (DSCP) values. This feature is often configured on the interfaces at the edge of a network to limit the rate of traffic entering or leaving the network. Using this feature, traffic that conforms to user-defined criteria can be sent through the interfaces, while traffic that exceeds or violates these criteria is sent out with a decreased priority setting or even dropped.

Table 2. New Features in 12.2(40)SG—Classic Supervisors and Supervisor Engine 6-E

Feature	Classic Supervisors	Supervisor Engine 6-E
Dynamic Multi-Protocol Ternary Content Addressable Memory	No	Yes
Service-Aware Resource Allocation	No	Yes
uRPF Strict Mode	No	Yes
IPv6 Forwarding in Hardware	No	Yes
Enhanced Interior Gateway Routing Protocol IPv6 Support	No	Yes
IPv6 Multicast Listener Discovery Snooping	No	Yes
Gateway Load Balancing Protocol	Yes	Yes
Support for TwinGig Converter Module	No	Yes
Robust and Flexible File Management System (FAT File System)	No	Yes
Storm Control: Per-Port Multicast Suppression	No	Yes

Cisco Modular QoS Command-Line-Interface	No	Yes
Two-Rate Three-Color Policing	No	Yes

Cisco IOS Software Packaging for the Cisco Catalyst 4500 Series

A new Cisco IOS Software package for Cisco Catalyst 4500 Series Switches was introduced in Cisco IOS Software Release 12.2(25)SG. It is a new foundation for features and functionality and provides consistency across all Cisco Catalyst switches. The new Cisco IOS Software release train is designated as 12.2SG.

Prior Cisco Catalyst 4500 Series Cisco IOS Software images for the Cisco Catalyst 4500 Series Switches, formerly known as Basic Layer 3 and Enhanced Layer 3, now map to IP Base and Enterprise Services, respectively. BGP is now included in the Enterprise Services image. All currently shipping Cisco Catalyst 4500 software features based on Cisco IOS Software are supported in the IP Base image of Release 12.2(40)SG, with a few exceptions.

The IP Base image does not support enhanced routing features such as NSF/SSO, BGP, EIGRP, EIGRPv6, OSPF, OSPFv3, IS-IS, Internetwork Packet Exchange (IPX), AppleTalk, VRF-lite, and Policy-Based Routing (PBR). The IP Base image supports EIGRP-Stub for limited routing on Supervisor Engines II-Plus, II-Plus-TS, II-Plus-10GE, IV, V, V-10GE, and 6-E.

The Enterprise Services image supports all Cisco Catalyst 4500 Series software features based on Cisco IOS Software, including enhanced routing. Customers planning to enable BGP for Supervisor Engine IV, V, or V-10GE will no longer need to purchase a separate BGP license (FR-IRC4) because BGP is included in the Enterprise Services package. Table 2 shows a more detailed description of the feature differences between the IP Base and Enterprise Services (ES) images as they relate to the Cisco Catalyst 4500 Series supervisor engines.

Table 3. Feature Comparison for Cisco IOS Software Release 12.2(40)SG IP Base and Enterprise Services

Feature	Supervisor Engine II-Plus, II-Plus-TS, II-Plus-10GE: IP Base	Supervisor Engine IV: IP Base	Supervisor Engine IV: ES	Supervisor Engine V: IP Base	Supervisor Engine V: ES	Supervisor Engine V-10GE: IP Base	Supervisor Engine V-10GE: ES	Supervisor Engine 6-E: IP Base	Supervisor Engine 6-E: ES
ISSU	Yes*	Yes	Yes	Yes	Yes	Yes	Yes	1HCY08	1HCY08
Network Admission Control (NAC) v2.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RIP and Static Route	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NetFlow v1, v5, or v8	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No
EIGRP	No	No	Yes	No	Yes	No	Yes	No	Yes
EIGRP-Stub	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
OSPF/IS-IS	No	No	Yes	No	Yes	No	Yes	No	Yes
BGP	No	No	Yes	No	Yes	No	Yes	1HCY08	1HCY08
NSF-aware	No	No	Yes	No	Yes	No	Yes	1HCY08	1HCY08

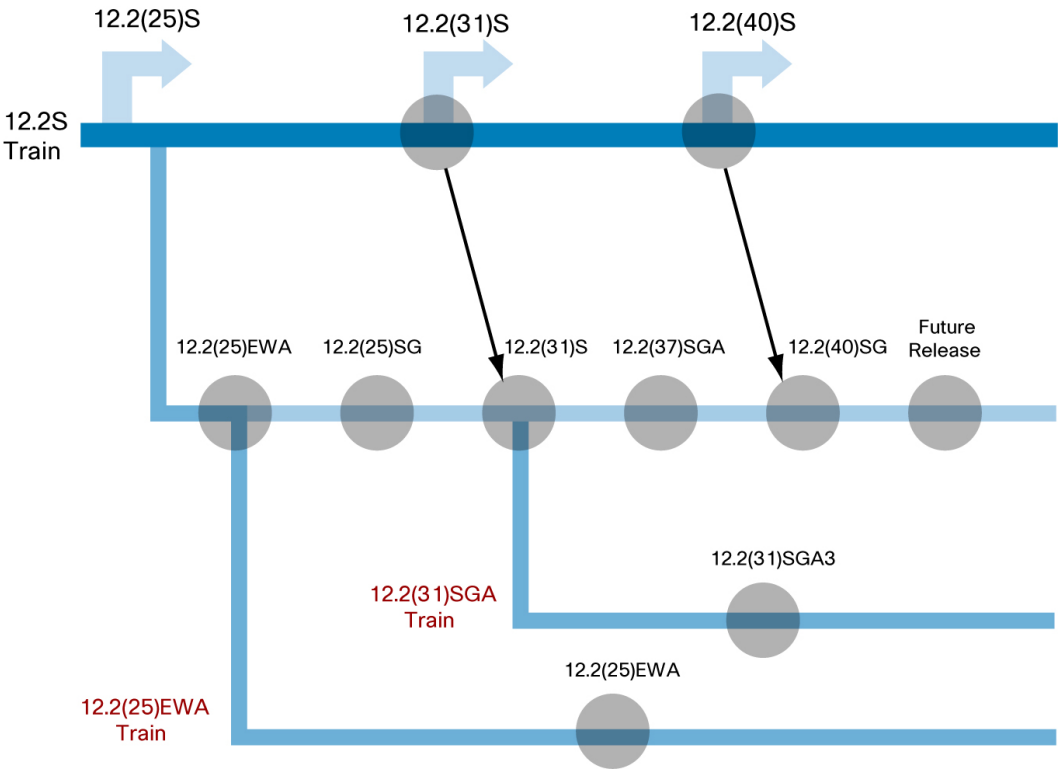
NSF-aware EIGRP-stub	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1HCY08	1HCY08
NSF/SSO	No	No	Yes	No	Yes	No	Yes	1HCY08	1HCY08
SSO Aware HSRP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1HCY08	1HCY08
VRF-lite	No	No	Yes	No	Yes	No	Yes	No	Yes
AppleTalk	No	No	Yes	No	Yes	No	Yes	No	No
IPX	No	No	Yes	No	Yes	No	Yes	No	No
PBR	No	No	Yes	No	Yes	No	Yes	Future	Future
IPv6 (Hardware-based)	No	No	No	No	No	No	No	Yes	Yes

* ISSU is not supported on the Supervisor Engine II-Plus-TS.

Cisco Catalyst 4500 Cisco IOS Software Migration Guide

Figure 1 displays the Cisco IOS Software Release 12.2(40)SG plan relative to the 12.2S release train and identifies the recommended migration path. Note that 12.2(40)SG will not be the base release for a new maintenance train. Currently, the Cisco Catalyst 4500 platform has two active maintenance trains: 12.2(25)EWA and 12.2(31)SGA.

Figure 1. Cisco IOS Software Release Plan for the Cisco Catalyst 4500 Series



Summary of Migration Plan:

- Customers requiring the latest Cisco Catalyst 4500 Series hardware and software features should migrate to Cisco IOS Software Release 12.2(40)SG.
- Cisco IOS Software Release 12.2(31)SGA will continue offering maintenance releases. The latest release from the 12.2(31)SGA maintenance train is 12.2(31)SGA3.
- Cisco IOS Software Release 12.2(25)EWA will continue offering maintenance releases. The latest release from the 12.2(25)EWA maintenance train is 12.2(25)EWA10.

Support

Support for Cisco IOS Software Release 12.2(40)SG follows the standard Cisco support policy, available at http://www.cisco.com/en/US/products/products_end-of-life_policy.html.

For more information about the Cisco Catalyst 4500 Series, visit: http://www.cisco.com/univercd/cc/td/doc/product/lan/cat4000/index.htm.

Ordering Information

Tables 3, 4, and 5 provide product numbers and ordering information for Cisco IOS Software Release 12.2(40)SG and supporting hardware.

Table 4. Cisco IOS Software Release 12.2(40)SG Product Numbers and Images

Product Number	Description	Image
S45IPB-12240SG(=)	Cisco IOS Software for Supervisor Engines II-Plus, II-Plus-TS, II-Plus-10GE, IV, V, and V-10GE (IP Base image without Crypto)	Cat4500-ipbase-mz
S45IPBK9-12240SG(=)	Cisco IOS Software for Supervisor Engines II-Plus, II-Plus-TS, II-Plus-10GE, IV, V, and V-10GE (IP Base image with Triple Data Encryption Standard [3DES])	Cat4500-ipbasek9-mz
S45ES-12240SG(=)	Cisco IOS Software for Supervisor Engines IV, V, and V-10GE (Enterprise Services image with BGP support, without Crypto)	Cat4500-entservices-mz
S45ESK9-12240SG(=)	Cisco IOS Software for Supervisor Engines IV, V, and V-10GE (Enterprise Services image with 3DES and BGP support)	Cat4500-entservicesk9-mz
S45EIPB-12240SG(=)	Cisco IOS Software for Supervisor Engine 6-E (IP Base image)	Cat4500e-ipbase-mz
S45EIPBK9-12240SG(=)	Cisco IOS Software for Supervisor Engine 6-E (IP Base image with 3DES)	Cat4500e-ipbasek9-mz
S45EES-12240SG(=)	Cisco IOS Software for Supervisor Engine 6-E (Enterprise Services image)	Cat4500e-entservices-mz
S45EESK9-12240SG(=)	Cisco IOS Software for Supervisor Engine 6-E (Enterprise Services image with 3DES)	Cat4500e-entservicesk9-mz

Table 5. Cisco Catalyst 4500 ISSU Paper Licenses (One per Chassis)

Product Number	Description
FR45-ISSU-LIC(=)	Cisco Catalyst 45xxR Series ISSU paper license. Requires dual supervisor engines.
FR45-ISSU-POE-LIC	Cisco Catalyst 45xxR Series ISSU promotional PoE paper license. Requires dual supervisor engines and at least 48-port PoE ports in a new factory-configured system.

Table 6. Cisco IOS Software Release 12.2(40)SG Hardware Support

Product Number	Description
WS-X4013+	Cisco Catalyst 4500 Series Supervisor Engine II-Plus
WS-X4013+/2	Cisco Catalyst 4500 Series Redundant Supervisor Engine II-Plus
WS-X4013+TS	Cisco Catalyst 4503 Series Supervisor Engine II-Plus-TS

WS-X4013+10GE	Cisco Catalyst 4500 Series Supervisor Engine II-Plus-10GE
WS-X4013+10GE/2	Cisco Catalyst 4500 Series Redundant Supervisor Engine II-Plus-10GE
WS-X4515	Cisco Catalyst 4500 Series Supervisor Engine IV
WS-X4515/2	Cisco Catalyst 4500 Series Redundant Supervisor Engine IV
WS-X4516	Cisco Catalyst 4500 Series Supervisor Engine V
WS-X4516/2	Cisco Catalyst 4500 Series Redundant Supervisor Engine V
WS-X4516-10GE	Cisco Catalyst 4500 Series Supervisor Engine V-10GE
WS-X4516-10GE/2	Cisco Catalyst 4500 Series Redundant Supervisor Engine V-10GE
WS-X45-Sup6-E	Cisco Catalyst 4500 E-Series Supervisor Engine 6-E
WS-X45-Sup6-E/2	Cisco Catalyst 4500 E-Series Redundant Supervisor Engine 6-E
WS-C4503	Cisco Catalyst 4503 Switch chassis
WS-C4503-E	Cisco Catalyst 4503 E-series Switch chassis
WS-C4506	Cisco Catalyst 4506 Switch chassis
WS-C4506-E	Cisco Catalyst 4506 E-series Switch chassis
WS-C4507R	Cisco Catalyst 4507R Switch chassis
WS-C4507R-E	Cisco Catalyst 4507R E-series Switch chassis
WS-C4510R	Cisco Catalyst 4510R Switch chassis
WS-C4510R-E	Cisco Catalyst 4510R E-series Switch chassis
WS-X4124-FX-MT(=)	Cisco Catalyst 4500 Series 24-port Fast Ethernet switching module, 100BASE-FX multimode fiber (MMF), MTRJ
WS-X4124-RJ45(=)	Cisco Catalyst 4500 Series 24-port 10/100 module (RJ-45)
WS-X4148-FX-MT(=)	Cisco Catalyst 4500 Series 48-port Fast Ethernet switching module, 100BASE-FX, MMF, MTRJ
WS-X4148-FE-LX-MT(=)	Cisco Catalyst 4500 Series 48-port Fast Ethernet switching module, 100BASE-LX10 single-mode fiber, MTRJ
WS-X4148-RJ(=)	Cisco Catalyst 4500 Series 48-port 10/100 module (RJ-45)
WS-X4148-RJ21(=)	Cisco Catalyst 4500 Series 48-port 10/100 module, telco (4xRJ-21)
WS-X4148-RJ45V(=)	Cisco Catalyst 4500 Series 48-port inline power 10/100 module (RJ-45)
WS-X4148-FE-BD-LC(=)	Cisco Catalyst 4500 Series 48-port 100BASE-BX10-D line card
WS-X4224-RJ45V(=)	Cisco Catalyst 4500 Series 24-port Power over Ethernet (PoE) 10/100 module (RJ-45)
WS-X4232-GB-RJ(=)	Cisco Catalyst 4500 Series 32-port 10/100 (RJ-45), 2-port Gigabit Ethernet module (GBIC)
WS-X4232-RJ-XX(=)	Cisco Catalyst 4500 Series 32-port 10/100 (RJ-45) with modular uplink slot
WS-X4248-FE-SFP(=)	Cisco Catalyst 4500 Series 48-port 100BASE-X (SFP optics optional)
WS-X4248-RJ45V(=)	Cisco Catalyst 4500 Series 48-port PoE 10/100 (RJ-45)
WS-X4248-RJ21V(=)	Cisco Catalyst 4500 Series 48-port PoE 10/100, telco (4xRJ-21)
WS-X4424-GB-RJ45(=)	Cisco Catalyst 4500 Series 24-port 10/100/1000 module (RJ-45)
WS-X4306-GB (=)	Cisco Catalyst 4500 Series 6-port Gigabit Ethernet module (GBIC)
WS-X4302-GB (=)	Cisco Catalyst 4500 Series 2-port Gigabit Ethernet line card (GBIC)
WS-X4412-2GB-T (=)	Cisco Catalyst 4500 Series 12-port Gigabit Ethernet module, 1000BASE-T (RJ-45) with two 1000BASE-X GBICs
WS-X4418-GB (=)	Cisco Catalyst 4500 Series 18-port Gigabit Ethernet module, server switching (GBIC)
WS-X4448-GB-RJ45 (=)	Cisco Catalyst 4500 Series 48-port 10/100/1000 module (RJ45)
WS-X4448-GB-SFP (=)	Cisco Catalyst 4500 Series 48-port 1000BASE-X (SFP optics optional)
WS-X4506-GB-T (=)	Cisco Catalyst 4500 Series 6-port alternatively wired 10/100/1000 PoE or 1000BASE-X, SFP optics
WS-X4524-GB-RJ45V (=)	Cisco Catalyst 4500 Series 24-port PoE 10/100/1000 line card (RJ-45)
WS-X4548-GB-RJ45 (=)	Cisco Catalyst 4500 Series 48-port 10/100/1000 line card (RJ45)

WS-X4548-GB-RJ45V (=)	Cisco Catalyst 4500 Series 48-port PoE 10/100/1000 line card (RJ45)
WS-X4606-X2-E (=)	Cisco Catalyst 4500 E-Series 6-Port 10GbE (X2)
WS-X4648-RJ45V-E (=)	Cisco Catalyst 4500 E-Series 48-Port PoE 802.3af 10/100/1000(RJ45)
WS-X4648-RJ45V+E (=)	Cisco Catalyst 4500 E-Series 48-Port Premium PoE 10/100/1000
WS-U4504-FX-MT (=)	Cisco Catalyst 4500 Series 4-port uplink daughter card 100BASE-FX (MTRJ)
WS-G5483=	1000BASE-T GBIC
WS-G5484 (=)	1000BASE-SX short-wavelength GBIC (multimode only)
WS-G5486 (=)	1000BASE-LX/LH long-haul GBIC (single-mode or multimode)
WS-G5487 (=)	1000BASE-ZX extended-reach GBIC (single-mode)
MEM-C4K-FLD64M (=)	Cisco Catalyst 4500 Series Compact Flash, 64-MB option
MEM-C4K-FLD128M (=)	Cisco Catalyst 4500 Series Compact Flash, 128-MB option
PWR-C45-4200ACV	Cisco Catalyst 4500 4200W AC dual input power supply (data + PoE)
PWR-C45-2800ACV	2800W AC power supply for Cisco Catalyst 4503, 4506, and 4507R chassis
PWR-C45-1400DC	Cisco Catalyst 4500 Series 1400W DC power supply
PWR-C45-1400DC-P	Cisco Catalyst 4500 Series 1400W DC power supply with integrated PEM
PWR-C45-1400AC	Cisco Catalyst 4500 Series 1400W AC power supply (data only)
PWR-C45-1300ACV	1300W AC power supply for Cisco Catalyst 4503, 4506, and 4507R chassis
PWR-C45-1000AC	1000W AC power supply for Cisco Catalyst 4503, 4506, and 4507R chassis (data only)
CWDM-GBIC-xxxx	Cisco 1000BASE coarse wavelength-division multiplexing (CWDM) xxxx nm GBIC, where xxxx is the number 1470, 1490, 1510, 1530, 1550, 1570, 1590, or 1610
DWDM-GBIC-xx.yy	Cisco 1000BASE dense wavelength-division multiplexing (DWDM) ITU 100-GHz grid 15xx.yy nm GBIC
DWDM-SFP-xx.yy	Cisco 1000BASE dense wavelength-division multiplexing (DWDM) ITU 100-GHz grid 15xx.yy nm SFP
WDM-GBIC-REC=	Cisco receive-only 1000BASE-WDM GBIC
WS-F4531(=)	NetFlow Services Card for Cisco Catalyst 4500 Series Supervisor Engines IV and V

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

Europe Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: +31 0 800 020 0791
Fax: +31 0 20 357 1100

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

C25-403891-01 10/07