CISCO SYSTEMS

Cisco **IOS** Software Release 12.1(13)EW for the Catalyst 4000/4500 Supervisor Engine III and Supervisor Engine IV

This product bulletin lists the hardware and software features that are supported in Cisco IOS ® Software Release 12.1(13)EW for the Cisco Catalyst ® 4000/4500 Supervisor Engine III and Supervisor Engine IV. Cisco IOS Software Release 12.1(13)EW is derived from the Cisco IOS Software 12.1E train and is supported on the Cisco Catalyst 4000/4500 Supervisor Engine III and Supervisor Engine IV. Cisco IOS Release 12.1(13)EW is not supported on the Catalyst 4000 Supervisor Engine I or Supervisor Engine II, or any other Cisco switching or routing platforms.

Cisco IOS Software Release 12.1(13)EW Hardware Support

Product Number	Description
WS-X4014=	Cisco Catalyst 4000/4500 Supervisor Engine III (spare)
WS-X4515=	Cisco Catalyst 4000/4500 Supervisor Engine IV (spare)
WS-X4515/2=	Cisco Catalyst 4507R Series Redundant Supervisor Engine IV (spare)
WS-C4503	Cisco Catalyst 4503 Chassis
WS-C4506	Cisco Catalyst 4506 Chassis
WS-C4507R	Cisco Catalyst 4507R Chassis
WS-C4006-S3	Cisco Catalyst 4006 Chassis, with Supervisor Engine III and 2ACpower supplies
WS-C4006-S3-DC	Cisco Catalyst 4006 Chassis, with Supervisor Engine III and 2DCpower supplies
WS-C4006-S4	Cisco Catalyst 4006 Chassis, with Supervisor Engine IV and 2ACpower supplies
WS-C4006-S4-DC	Cisco Catalyst 4006 Chassis, with Supervisor Engine IV and 2DC power supplies
WS-X4124-FX-MT (=)	Cisco Catalyst 4000 FE Switching Module, 24-100FX MMF (MTRJ)
WS-X4148-FX-MT (=)	Cisco Catalyst 4000 FE Switching Module, 48-100FX MMF (MTRJ)
WS-X4148-RJ (=)	Cisco Catalyst 4000 10/100 Module, 48 ports (RJ-45)
WS-X4148-RJ21 (=)	Cisco Catalyst 4000 10/100 Module, 48 ports Telco (4xRJ-21)
WS-X4148-RJ45V (=)	Cisco Catalyst 4000 Inline Power 10/100, 48 ports (RJ-45)

Product Number	Description
WS-X4232-GB-RJ (=)	Cisco Catalyst 4000 32-10/100 (RJ-45), 2-GE (GBIC) Module
WS-X4232-RJ-XX (=)	Cisco Catalyst 4000 32-10/100 (RJ-45) + 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 GE Module, 12-1000T(RJ45)+2-1000X (GBIC)
WS-X4418-GB (=)	Cisco Catalyst 4000 GE Module, Server Switching 18-port (GBIC)
WS-X4448-GB-LX (=)	Cisco Catalyst 4000 48-port 1000BASE-LX (SFP)
WS-X4448-GB-RJ45 (=)	Catalyst 4000 48-port 10/100/1000 Module (RJ-45)
WS-U4504-FX-MT (=)	Catalyst 4000 Uplink Daughter Card, 4-port 100FX (MTRJ)
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 (=)	Catalyst 4000 Compact Flash, 64 MB option
MEM-C4K-FLD128M (=)	Catalyst 4000 Compact Flash, 128 MB option
WS-X4095-PEM (=)	Catalyst 4000 DC Power Entry Module
PWR-C45-2800ACV	2800 Watt AC power supply for Catalyst 4503/4506/4507 chassis
PWR-C45-1300ACV	1300 Watt AC power supply for Catalyst 4503/4506/4507 chassis
PWR-C45-1000AC	1000 Watt AC power supply for Catalyst 4503/4506/4507 chassis
CWDM-GBIC-xxxx	Cisco 1000BASE-CWDM xxxx nm GBIC, where xxxx is 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610
New hardware supported by Cisco IOS Software Release 12.1(13)EW	
WS-F4531 (=)	NetFlow Services Card on Supervisor Engine IV
WS-G5483 (=)	Cisco 1000BASE-T GBIC
WS-X4604-GWY(=)	Catalyst 4000 Access Gateway Module

New Hardware Features

Catalyst 4000 NetFlow Services Card

The Cisco Catalyst 4000 NetFlow Services Card (WS-F4531) is an optional daughter card for the Catalyst 4000/4500 Supervisor Engine IV. It extends the functions of the Supervisor Engine IV by collecting NetFlow statistics and enhanced virtual LAN (VLAN) statistics without affecting the forwarding performance rates of the supervisor engine. It can be shipped pre-installed with a Supervisor Engine IV from the factory or as a separate, field-replaceable unit. It is not supported on the Supervisor Engine I, II, or III.

Cisco 1000BASE-T GBIC

The Cisco 1000BASE-T Gigabit Interface Converter (GBIC) (WS-G5483=) provides full-duplex Gigabit Ethernet connectivity to high-end workstations, servers, and between switches over existing copper network infrastructures. This GBIC technology uses the industry's flexible, standards-based 1000BASE-X design, allowing for a simple and low cost 1-port (RJ-45) 1000BASE-T solution.

Catalyst 4000 Access Gateway Module

The Cisco Catalyst ® 4000 Access Gateway Module (AGM) integrates Cisco IOS® routing and telephony services into the Catalyst 4000 Family of switches. Combining the LAN, WAN, and telephony infrastructure enables businesses to reduce network complexity, improve network deployment times, and prepare for voice, video, and data convergence. Session command is not supported in this IOS release for AGM.

Cisco IOS Software Release 12.1(13)EW Software Support

New Software Features
- Dynamic Buffer Limiting
- Policy-based Routing
- Jumbo frames
- Compliant with IEEE 802.3ad specification
- Port security
- Unicast Media Access Control (MAC) address filtering
- Private VLAN Dynamic Host Configuration Protocol (DHCP) snooping
- Secure Shell (SSH v1)
- VLAN Membership Policy Server (VMPS) client
- Intermediate System to Intermediate System (IS-IS)
- Unidirectional Ethernet port
- NetFlow statistics collection and export
- Enhanced VLAN statistics
- Layer 2 traceroute utility
- Enhanced Simple Network Management Protocol (SNMP) Management Information Base (MIB) support

Dynamic Buffer Limiting

Dynamic Buffer Limiting (DBL) is a congestion-avoidance quality-of-service (QoS) technique for the Cisco Catalyst 4000/4500 Supervisor Engine IV. DBL effectively recognizes and handles numerous misbehaving flows at wire speed and operates in the switch hardware. Misbehaving flows take all the bandwidth that is available, consume switch buffers, fill output queues, and do not respond to congestion feedback such as random early detection (RED)-like packet dropping. Misbehaving flows can cause denial of service to well-behaved flows.

DBL operates by keeping track of buffering for each flow in the switch, reacting quickly to excessive buffer demands from misbehaving flows and limiting their data rates. A flow is defined as a source IP address, destination IP address, IP protocol, Layer 4 Transmission Control Protocol/User Datagram Protocol (TCP/UDP) ports, and VLAN. If the

buffer usage of a flow exceeds a dynamically computed buffer limit, DBL constrains its buffering until the flow reaches a lower threshold. DBL is implemented at wire speed on all ports in the Catalyst 4000 Family with Supervisor Engine IV.

Policy-Based Routing

Policy-based routing (PBR) provides a flexible means of routing packets based on the policies defined by the network administrators. PBR extends and complements the traditional destination-based IP forwarding with routing protocols. Policies can be based on IP addresses, port numbers, or protocols. PBR enables users to classify traffic based on extended access control list (ACL) criteria, and route packets to specific traffic-engineered paths. PBR is typically enabled when certain packets need to be routed some way other than the obvious shortest path. Possible PBR applications include equal-access routing or protocol-sensitive routing, source-sensitive routing, routing based on interactive versus batch traffic, or routing based on dedicated links. PBR is supported in Cisco IOS Software on the Catalyst 4000 with a combination of hardware and software forwarding.

Jumbo Frames

Jumbo frames are Ethernet frames up to 9216 bytes (larger than the IEEE Ethernet maximum transmission unit [MTU]). This feature enables a switch to forward frames as large as 9216 bytes, rather than declaring them "oversized" and discarding them. Jumbo frames are only supported on nonblocking Gigabit Ethernet ports in the Catalyst 4000 Family with Supervisor Engine III or IV. Both Layer 2 and Layer 3 switching can be enabled for jumbo frames on a per-port basis. Jumbo frames are typically enabled to improve performance of large data transfers between servers.

IEEE 802.3ad

Link Aggregation Control Protocol (LACP), as defined in IEEE 802.3ad, enables Cisco switches to negotiate Ethernet channels with other devices that conform to the 802.3ad specification. 802.3ad allows the grouping of multiple ports into one logical port to provide higher aggregated bandwidths, traffic load sharing, and link redundancy. It bundles ports with similar characteristics to form a channel through dynamic negotiation with a partner system. EtherChannel® technology can be either Layer 2 (MAC-based) or Layer 3 (IP-based). 802.3ad complements the Cisco Port Aggregation Protocol (PAgP) for Fast EtherChannel technology and Gigabit EtherChannel technology. Both 802.3ad and PAgP can co-exist on the Catalyst 4000 chassis.

Port Security

Port security enables a network administrator to restrict the MAC addresses allowed or the maximum number of MAC addresses on a per-port basis. The allowed MAC addresses on a given port can be either statically configured by the administrator or dynamically learned by the switch.

A security violation occurs when either the maximum number of MAC addresses on a given port is exceeded or a frame with a nonsecure source MAC address is seen on that port. The port is then shut down, or alternatively, an SNMP trap is generated. Aging with either inactivity or a predefined time interval can be configured with port security for the dynamic or static secure MAC addresses. Port security on the Catalyst 4000 is not supported on trunk ports, dynamic ports, Switched Port Analyzer (SPAN) destination ports, or 802.1x ports. Port security locks down a port and blocks access from a station with a MAC address different from the ones specified for that port.

Unicast MAC Filtering

Unicast MAC filtering drops unicast packets that have the given source or destination MAC address in a particular VLAN. Specifying its MAC address and VLAN filters a host. All packets with the specified source or destination host MAC address are discarded in the given VLAN. The specified MAC addresses are saved in the configuration file; they do not age out. Unicast MAC filtering is used to protect the Layer 2 network from malicious activities generated by rogue or hostile devices as they move around the campus.

Private VLAN DHCP Snooping

DHCP snooping is a per-port security mechanism to differentiate an untrusted switch port connected to an end user from a trusted switch port connected to a DHCP server or another switch. It can be enabled on a per-VLAN basis. DHCP snooping intercepts all DHCP messages between a client and a DHCP server, and tracks DHCP IP address assignment binding between the DHCP server and the client. DHCP snooping can be used to filter the DHCP server response messages from an untrusted port, and perform per-port DHCP message rate limiting. DHCP snooping is typically used to prevent DHCP-related denial-of-service attacks by identifying subscribers and filtering unauthorized network traffic. Private VLAN DHCP snooping extends the DHCP snooping function to private VLANs, where DHCP packets in both primary and secondary VLANs are intercepted and processed within the private VLAN.

Secure Shell

Secure Shell (SSH) is an application and a protocol that provides a secure remote connection to a switch. SSH provides strong data encryption using standard cryptographic mechanisms at the application layer. SSH avoids the transmission of clear text passwords across the unsecured network. Any device that wants to accept SSH connections must be running an SSH server, and an SSH client is required to initiate a connection to the server. The Cisco Catalyst IOS Software provides both SSH server and SSH client capabilities. End users will be able to initiate connections to the switch using SSH clients, and will be able to initiate SSH connections from the switch to other devices on the network. A cryptographic image of the Cisco Catalyst IOS is needed for this feature.

VMPS Client

VLAN Management Policy Server (VMPS) is a database of MAC address-to-VLAN mappings. The VMPS client feature enables a VLAN to be assigned to a dynamic port by a VMPS server based on the source MAC address of the attached host. A dynamic port can belong to one VLAN at a time, but the VLAN it belongs to can change dynamically with different attached hosts. Dynamic ports with the VMPS client function in the Cisco Catalyst 4000 enable users to stay in the same VLAN while moving from port to port. VMPS server functions are not supported in the Cisco Catalyst IOS Software.

Intermediate System to Intermediate System

Intermediate System to Intermediate System (IS-IS) is a link-state routing protocol. It distributes network connectivity information to all participating routers in the forms of Link State PDUs (LSPs). Each router maintains a full topology map of the network based on its current database of LSPs, and runs a shortest path first algorithm to discover the shortest end-to-end path to each entity. IS-IS offers fast convergence to avoid packet delays or losses with problematic links or routers. IS-IS is typically used by ISPs for intradomain routing to exchange reachability information between all the subnets and routers in their respective backbones. A Cisco Catalyst 4000 enhanced Layer 3 Cisco IOS image is required for this feature.

Unidirectional Ethernet Port

Unidirectional Ethernet Port feature enables a Gigabit Ethernet port to transmit traffic without having status information about the receiving Gigabit Ethernet port and vice versa. The Unidirectional Ethernet Port feature is typically used to transport video streams over Gigabit Ethernet infrastructure. The Unidirectional Ethernet Port feature is supported on nonblocking Gigabit Ethernet ports in the Catalyst 4000 Family and can be enabled on a per-port basis. A unidirectional transmit port should be connected with a unidirectional receive port on the other end, and vice versa. Applying the Gigabit EtherChannel feature to a combination of bidirectional and unidirectional Gigabit Ethernet ports can create asymmetric links. Enabling the Unidirectional Ethernet Port feature will automatically disable UniDirectional Link Detection (UDLD) on the port.

NetFlow Statistics Collection and Export

NetFlow statistics collection and export are supported by the NetFlow Services Card on the Cisco Catalyst 4000/4500 Supervisor Engine IV. NetFlow statistics enable flow-level monitoring of all IPv4 routed traffic through the switch. A flow is defined as a source IP address, destination IP address, IP protocol, Layer 4 source port, and Layer 4 destination port. Collected statistics can be exported via NetFlow Data Export (NDE) to an external device, such as a NetFlow collector or a NetFlow analyzer. NetFlow statistics can be exported and analyzed for a variety of purposes such as network traffic accounting, usage-based network billing, network planning, network monitoring, and datamining.

Enhanced VLAN Statistics

Enhanced VLAN statistics extend the basic Layer 3 per-VLAN statistics to full output per-VLAN statistics. It collects and reports both routed and bridged traffic output VLAN statistics for the complete IEEE 802.1q VLAN range. Output packet count and byte count are included in VLAN statistics. Unicast statistics are separated from the multicast statistics. The NetFlow Services Card on the Catalyst 4000/4500 Supervisor Engine IV is required for thisfeature.

Layer 2 Traceroute

Traceroute is a widely used utility to trace the Layer 3 path of packets in an IP network for debugging purposes. Layer 2 traceroute extends Layer 3 traceroute to the "physical" path of unicast traffic across each Layer 2 device between a source and a destination using Cisco Discovery Protocol data. Layer 2 traceroute shows the Layer 2 path taken by the packet by displaying the device and port information of all the intermediate Cisco Catalyst switches that the packet traverses. Layer 2 traceroute on the Catalyst 4000 does not support multicast traffic.

Enhanced SNMP MIB Support

The following additional SNMP MIBs are supported in this release:
- IEEE8023-LAG-MIB
- CISCO-LAG-MIB
- CISCO-CLASS-BASED-QOS-MIB
- CISCO-NDE-MIB
- CISCO-PORT-SECURITY-MIB

Support

Support for the Cisco IOS Software Release 12.1(13)EW follows the standard Cisco support policy, which is available at:

www.cisco.com/warp/public/437/27.html

For more information about the Cisco Catalyst 4500 Series, visit:

http://www.cisco.com/go/catalyst4500.

Product Numbers

Table 1 Product Numbers of Cisco IOS Software Release 12.1(13)EW Feature Sets, Images, and Software Licenses

	Description	Image
S4KL3-12113EW	Cisco IOS Software for the Catalyst 4000 Family Basic Layer 3 and voice software image including Routing Information Protocol (RIP) v1, RIP v2, static routes, AppleTalk, and Internetwork Packet Exchange (IPX) softwarerouting	cat4000-is-mz.121-13.EW
S4KL3E-12113EW	Cisco IOS Software for the Catalyst 4000 Family Enhanced Layer 3 and voice software image including Open Shortest Path First (OSPF), IS-IS, Interior Gateway Routing Protocol (IGRP), and Enhanced Interior Gateway Routing Protocol (EIGRP)	cat4000-is-mz.121-13.EW
S4KL3K2-12113EW	Cisco IOS Software for the Catalyst 4000 Family with Triple Data Encryption Standard (3DES) strongencryption Basic Layer 3 and voice software image including SSH v1, RIP v1, RIP v2, static routes, AppleTalk, and IPX software routing	cat4000-ik2s-mz.121-13.EW
S4KL3EK2-12113EW	Cisco IOS Software for the Catalyst 4000 Family with 3DES strongencryption Enhanced Layer 3 and voice software image including OSPF, IS-IS, IGRP, and EIGRP	cat4000-ik2s-mz.121-13.EW
FR-IRC4	Cisco IOS Software for the Catalyst 4000 Family InterDomain Routing Feature License including Border Gateway Protocol Version 4 (BGP4)	—

For additional information about this release, send e-mail to ask-c4000-pm@cisco.com.

CISCO SYSTEMS

Corporate 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: 408 526-4100

European Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
Capital Tower
168 Robinson Road
#22-01 to #29-01
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

Cisco Systems has more than 200 offices in the following countries and regions. Addresses, phone numbers, and fax numbers are listed on the
Cisco Web site at www.cisco.com/go/offices

Argentina • Australia • Austria • Belgium • Brazil • Bulgaria • Canada • Chile • China PRC • Colombia • Costa Rica • Croatia
CzechRepublic • Denmark • Dubai, UAE • Finland • France • Germany • Greece • Hong Kong SAR • Hungary • India • Indonesia • Ireland
Israel • Italy • Japan • Korea • Luxembourg • Malaysia • Mexico • TheNetherlands • New Zealand • Norway • Peru • Philippines • Poland
Portugal • Puerto Rico • Romania • Russia • Saudi Arabia • Scotland • Singapore • Slovakia • Slovenia • South Africa • Spain • Sweden
Switzerland • Taiwan • Thailand • Turkey • Ukraine • United Kingdom • United States • Venezuela • Vietnam • Zimbabwe