Release Notes for the Catalyst 4500 Series Switch, Cisco IOS Releases 15.2(1)Ex

Current release
IOS 15.2(1)E3—July 7, 2014

Prior release
IOS 15.2(1)E2, IOS 15.2(1)E1, IOS 15.2(1)E—August 26, 2013

These release notes describe the features, modifications, and caveats for Cisco IOS Release 15.2(1)E on the Catalyst 4500 series switch.

Cisco IOS Software Release XE 3.5.0E is part of the new software releases on Cisco Catalyst 2960S, 2960C, 3560C, 3750-X, 3560-X, 4500E and 4500-X, 4900M, and 4948E/E-F Series Switches. These releases deliver new software and hardware innovations in campus access and aggregation deployments that span across many technologies, including enhanced support for IPv6, security, high availability, and IP multicast.

Support for Cisco IOS Software Release 15.2(1)E follows the standard Cisco Systems® support policy, available at

http://www.cisco.com/en/US/products/products_end-of-life_policy.html

For more information on the Catalyst 4500 Series Switches, visit:

http://www.cisco.com//en/US/products/hw/switches/ps4324/index.html

Note Although their Release Notes are unique, the platforms Catalyst 4900M/Catalyst 4948E/Catalyst 4948E-F and Catalyst 4500 leverage the same *Software Configuration Guide*, *Command Reference Guide*, and *System Message Guide.*

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Contents

This publication consists of these sections:

Cisco IOS Software Packaging

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. Beginning with 12.2(53)SG2, we support the Enterprise Services image on Supervisor Engine 6L-E.

The IP Base image supports Open Shortest Path First (OSPF) for Routed Access, Enhanced Interior Gateway Routing Protocol (EIGRP) "limited" Stub Routing, Nonstop Forwarding/Stateful Switchover (NSF/SSO), and RIPv1/v2. The IP Base image does not support enhanced routing features such as BGP, Intermediate System-to-Intermediate System (IS-IS), Full OSPF, Full Enhanced Interior Gateway Routing Protocol (EIGRP) & Virtual Routing Forwarding (VRF-lite).

Cisco IOS Release 12.2(46)SG1 introduced a new LAN Base software and an IP upgrade image. These complement the existing IP Base and Enterprise Services images. The LAN base image is supported on Supervisor Engine 6L-E starting with Cisco IOS Release 12.2(52)XO. LAN Base image is primarily focused on customer access and Layer 2 requirements and therefore many of the IP Base features are not required. The IP upgrade image is available if at a later date you require some of those features.

Starting with Cisco IOS Release 15.0(2)SG, on the Catalyst 4500 Series Switch, support for NEAT feature has been extended from IP Base to LAN Base and support for HSRP v2 IPV6 has been extended from Enterprise Services to IP Base.

Starting with Cisco IOS Release 15.2(1)E, OSPF Routed Access in IP Base support rose to 1000 routes.

Cisco Classic IOS Release Strategy

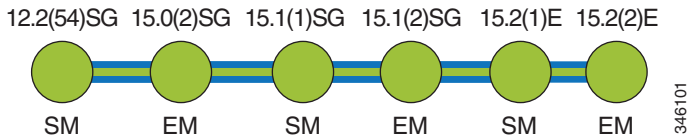
Customers using Supervisor Engine 6-E or 6L-E with Catalyst 4500 Series Switches who need the latest hardware and software features should migrate to Cisco IOS Release 15.2(1)E.

Note This release does not support older Supervisor Engines, including II+, III, IV, V, and V-10GE.

The Catalyst 4500 Series Switch has three maintenance trains: 12.2(53)SGx, 15.0(2)SGx, and 15.1(2)SGx. Cisco IOS Release 15.0(2)SGx is the recommended release for customers who require a release with a maintenance train.

Figure 1 displays the three active trains, 12.2(53)SG, 15.0(2)SG, and 15.1(2)SG.

Figure 1 Software Release Strategy for the Catalyst 4500 Series Switch



Support

Support for Cisco IOS Software Release 15.2(1)E follows the standard Cisco Systems® support policy, available at

http://www.cisco.com/en/US/products/products_end-of-life_policy.html

System Requirements

This section describes the system requirements:

Supported Hardware on Catalyst 4500 Series Switch

Table 1 lists the hardware supported on the Catalyst 4500 Series Switch.

Table 1 Supported Hardware

Product Number (append with "=" for spares)	**Product Description**	**Software Release**
		Minimum
Supervisor Engines		
WS-X45-Sup6-E	Catalyst 4500 E-series switch Supervisor Engine 6-E **Note** This engine is supported on legacy and E-series chassis.	12.2(40)SG
WS-X45-Sup6L-E	Catalyst 4500 E-series switch Supervisor Engine 6L-E **Note** This engine is supported on legacy and E-series 3,6, and 7 slot chassis.	12.2(52)XO
Gigabit Ethernet Switching Modules		
WS-X4302-GB	2-port 1000BASE-X (GBIC) Gigabit Ethernet module	12.1(19)EW
WS-X4306-GB	6-port 1000BASE-X (GBIC) Gigabit Ethernet switching module	12.1(8a)EW
WS-X4418-GB	18-port 1000BASE-X (GBIC) Gigabit Ethernet server switching module	12.1(8a)EW
WS-X4412-2GB-T	12-port 1000BASE-T Gigabit Ethernet and 2-GBIC ports switching module	12.1(8a)EW
WS-X4424-GB-RJ45	24-port 10/100/1000BASE-T Gigabit Ethernet RJ-45 switching module	12.1(8a)EW
WS-X4448-GB-LX	48-port 1000BASE-LX (small form-factor pluggable) Gigabit Ethernet fiber optic interface switching module	12.1(8a)EW
WS-X4448-GB-RJ45	48-port 10/100/1000BASE-T Gigabit Ethernet switching module	12.1(8a)EW
WS-X4448-GB-SFP	48-port 1000BASE-X (small form-factor pluggable) module	12.2(20)EW
WS-X4506-GB-T	6-port Alternately-Wired 10/100/1000BASE-T Catalyst 4500 series Power over Ethernet (PoE) 802.3af or 1000BASE-X SFP	12.2(20)EWA
WS-X4524-GB-RJ45V	24-port 10/100/1000BASE-T RJ-45 Catalyst 4500 series PoE 802.3af	12.2(18)EW
WS-X4548-GB-RJ45	48-port 10/100/1000BASE-T Gigabit Ethernet module	12.1(19)EW
WS-X4548-GB-RJ45V	48-port 10/100/1000BASE-T RJ-45 Catalyst 4500 series PoE 802.3af	12.2(18)EW
WS-X4548-RJ45V+	48-port 10/100/1000 Premium PoE line card	12.2(50)SG
WS-X4624-SFP-E	Non-blocking 24-port 1000BASEX (small form factor pluggable) module	12.2(44)SG
WS-X4640-CSFP-E	80 ports with Gigabit compact SFP (4:1 oversubscribed); 40 modules of Gigabit SFP line card (1000BaseX), providing 24 gigabits per-slot capacity (SFP optional) (2:1 oversubscribed)	15.1(1)SG
WS-X4648-RJ45V-E	48 port 10/100/1000 Mb with 2 to 1 oversubscription	12.2(40)SG
WS-X4648-RJ45V+E	48 port 10/100/1000 Mb with 2 to 1 oversubscription	12.2(40)SG
Fast Ethernet Switching Modules		
WS-X4124-FX-MT	24-port 100BASE-FX Fast Ethernet MT-RJ multimode fiber switching module	12.1(8a)EW
WS-X4148-FX-MT	48-port 100BASE-FX Fast Ethernet MT-RJ multimode fiber switching module	12.1(8a)EW

Table 1 Supported Hardware (continued)

Product Number (append with "=" for spares)	**Product Description**	**Software Release**
		Minimum
WS-X4148-FE-LX-MT	48-port 100BASE-LX10 Fast Ethernet MT-RJ single-mode fiber switching module	12.1(13)EW
WS-X4148-FE-BD-LC	48-port 100BASE-BX10-D module	12.2(18)EW
WS-X4248-FE-SFP	48-port 100BASE-X SFP switching module	12.2(25)SG
WS-U4504-FX-MT	4-port 100BASE-FX (MT-RF) uplink daughter card	12.1(8a)EW
Ethernet/Fast Ethernet (10/100) Switching Modules		
WS-X4124-RJ45	24-port 10/100 RJ-45 module	12.2(20)EW
WS-X4148-RJ	48-port 10/100 RJ-45 switching module	12.1(8a)EW
WS-X4148-RJ21	48-port 10/100 4xRJ-21 (telco connector) switching module	12.1(8a)EW
WS-X4148-RJ45V	48-port Pre-standard PoE 10/100BASE-T switching module	12.1(8a)EW for data support 12.1(11b)EW for data and inline power support
WS-X4224-RJ45V	24-port 10/100BASE-TX RJ-45 Cisco Catalyst 4500 series PoE 802.3af	12.2(20)EW
WS-X4232-GB-RJ	32-port 10/100 Fast Ethernet RJ-45, plus 2-port 1000BASE-X (GBIC) Gigabit Ethernet switching module	12.1(8a)EW
WS-X4248-RJ45V	48-port 10/100BASE-T RJ-45 Cisco Catalyst 4500 series PoE 802.3af	12.2(18)EW
WS-X4248-RJ21V	48-port 10/100 Fast Ethernet RJ-21 Cisco Catalyst 4500 series PoE 802.3af telco	12.2(18)EW
WS-X4232-RJ-XX	32-port 10/100 Fast Ethernet RJ-45 modular uplink switching module	12.1(8a)EW
Other Modules		
MEM-C4K-FLD64M	Catalyst 4500 series switch CompactFlash, 64 MB Option	12.1(8a)EW
MEM-C4K-FLD128M	Catalyst 4500 series switch CompactFlash, 128 MB Option	12.1(8a)EW
WS-F4531	Catalyst 4500 series switch NetFlow Services Card on Catalyst 4500 series switch Supervisor Engines IV and V	12.1(13)EW
WS-X4590=	Catalyst 4500 series switch Fabric Redundancy Modules	12.2(18)EW
PWR-C45-1000AC	Catalyst 4500 series switch 1000 Watt AC power supply for chassis 4503, 4506, and 4507R (data only)	12.1(12c)EW
PWR-C45-1400DC	Catalyst 4500 series switch 1400 Watt DC triple input power supply (data-only)	12.2(25)EW
PWR-C45-1400DC-P	Catalyst 4500 series switch 1400 Watt DC power supply with integrated PEM	12.1(19)EW
PWR-C45-1400AC	Catalyst 4500 series switch 1400 Watt AC power supply (data-only)	12.1(12c)EW
PWR-C45-1300ACV	Catalyst 4500 series switch 1300 Watt AC power supply with integrated voice for chassis 4503, 4506, and 4507R	12.1(12c)EW
PWR-C45-2800ACV	Catalyst 4500 series switch 2800 Watt AC power supply with integrated voice (data and PoE) for chassis 4503, 4506, and 4507R	12.1(12c)EW

Table 1 Supported Hardware (continued)

Product Number (append with "=" for spares)	**Product Description**	**Software Release**
		Minimum
PWR-C45-4200ACV	Catalyst 4500 series switch 4200 Watt AC dual input power supply with integrated voice (data and PoE)	12.2(25)EWA5
WS-P4502-1PSU	Catalyst 4500 series switch auxiliary power shelf (25-slot), including one PWR-4502	12.1(19)EW
PWR-4502	Catalyst 4500 series switch auxiliary power shelf redundant power supply	12.1(19)EW
PWR-C45-6000ACV	Catalyst 4500 Series Switch 6000 W AC power supply	12.2(53)SG
PWR-C45-9000ACV	Catalyst 4500 Series Switch 9000 W AC power supply	XE 3.4(0)SG, 15.1(2)SG

Table 1 briefly describes the four chassis in the Catalyst 4500 Series Switch. For the chassis listed in the table, refer to Table 4 on page 8 for software release information.

Chassis Description for the Catalyst 4500 Series Switch

Product Number (append with "=" for spares)	**Description of Modular Chassis**
WS-C4503	Catalyst 4503 chassis includes these components: • 3 slots • Fan tray
WS-C4506	Catalyst 4506 chassis includes these components: • 6 slots • Fan tray
WS-C4507R	Catalyst 4507R chassis includes these components: • 7 slots • Fan tray
WS-C4510R	Catalyst 4510R chassis includes these components: • 10 slots; slot 10 accepts only the Catalyst 4500 series 2-port Gigabit Ethernet line card • Fan tray

Table 2 DOM Support on the Catalyst 4500 Series Switch applies to these module

Transceiver Module
CWDM- SFP-*xx*
DWDM-GBIC-*xx*
DWDM-SFP
DWDM-X2-*xx*

Table 2 DOM Support on the Catalyst 4500 Series Switch applies to these module

Transceiver Module
GLC-BX-D
GLC-BX-U
GLC-LH-SMD
GLC-EX-SMD
GLC-FE-100EX
GLC-FE-100ZX
GLC-FE-100FX
SFP-10G-SR
SFP-10G-LR
SFP-10G-LRM
SFP-10G-ER
SFP-10G-ZR

For details on transceiver module compatibility information, please refer to the URL:

http://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html

Supported Hardware on Catalyst 4500 E-Series Switch

In addition to the classic line cards and supervisor engines, Cisco IOS Software Release 15.2(1)E 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 on Catalyst 4500 series switch (Table 3).

Table 3 Supported E-Series Hardware

Product Number	Description
WS-C4503-E	Cisco Catalyst 4500 E-Series 3-Slot Chassis • Fan tray • No Power Supply
WS-C4506-E	Cisco Catalyst 4500 E-Series 6-Slot Chassis • Fan tray • No Power Supply
WS-C4507R-E	Cisco Catalyst 4500 E-Series 7-Slot Chassis • Fan tray • No Power Supply • Redundant supervisor engine capability

Table 3 Supported E-Series Hardware

Product Number	Description
WS-C4507R+E	Cisco Catalyst 4500 E-Series 7-Slot 48 GB-ready Chassis • Fan tray • No Power Supply • Redundant supervisor engine capability
WS-C4510R-E	Cisco Catalyst 4500 E-Series 10-Slot Chassis • Fan tray • No Power Supply • Redundant supervisor engine capability • Slots 8, 9, and 10 are limited to 6Gbps when used with a Supervisor Engine 6-E or a Supervisor Engine 6L-E.
WS-C4510R+E	Cisco Catalyst 4500 E-Series 10-Slot 48 GB-ready Chassis • Fan tray • No Power Supply • Redundant supervisor engine capability • You cannot place a linecard with a backplane traffic capacity exceeding 6Gbps in slots 8, 9 and 10 of a Catalyst 4510R+E chassis when used with a Supervisor Engine 6-E or a Supervisor Engine 6L-E.
WS-X45-Sup6-E	Cisco Catalyst 4500 E-Series Sup 6-E, 2x10GE(X2) w/ TwinGig
WS-X45-Sup6L-E	Cisco Catalyst 4500 E-Series Sup 6L-E
WS-X4624-SFP-E	Cisco Catalyst 4500 E-series 24-Port 1000BaseX (small form factor pluggable) module
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) w/ TwinGig
WS-X4648-RJ45-E	Cisco Catalyst 4500 E-Series 48-Port 10/100/1000(RJ45)

Table 4 outlines the chassis and supervisor engine compatibility.
(M=Minimum release, R=Recommended release)

Table 4 Chassis and Supervisor Compatibility

Chassis	Sup 6-E	Sup 6L-E
WS-C4503-E	M: 12.2(40)SG	M: 12.2(52)XO
WS-C4506-E	M: 12.2(40)SG	M: 12.2(52)XO
WS-C4507R-E	M: 12.2(40)SG	M: 12.2(52)XO
WS-C4507R+E	M: 12.2(54)SG	M: 12.2(54)SG

Table 4 Chassis and Supervisor Compatibility

Chassis	Sup 6-E	Sup 6L-E
WS-C4510R-E	M: 12.2(40)SG	
WS-C4510R+E	M: 12.2(54)SG	

Feature Support by Image Type

Table 5 is a detailed list of features supported on Catalyst 4500 Series Switch running Cisco IOS Software Release 15.2(1)E. For the full list of supported features, check the Feature Navigator application:

http://tools.cisco.com/ITDIT/CFN/

Table 5 LAN Base, IP Base, and Enterprise Services Image Support on the Catalyst 4500 Series Switch

Feature	LAN Base	IP Base	Enterprise Services
2-way Community Private VLANs	No	Yes	Yes
8-Way CEF Load Balancing	No	Yes	Yes
10G Uplink Use	Yes	Yes	Yes
AAA Server Group	Yes	Yes	Yes
ACL Logging	Yes	Yes	Yes
ANCP Client	No	Yes	Yes
ANSI TIA-1057 LLDP - MED Location Extension	Yes	Yes	Yes
ANSI TIA-1057 LLDP - MED Support	Yes	Yes	Yes
AppleTalk 1 and 2 (not supported on Sup 6-E and 6L-E)	No	No	Yes
Auto SmartPorts	Yes	Yes	Yes
AutoQoS	Yes	Yes	Yes
Auto-MDIX	Yes	Yes	Yes
Auto-Voice VLAN (part of Auto QoS)	No	Yes	Yes
Bidirectional Forwarding Detection (BFD) Hardware Offload Support	No	Yes	Yes
BFD - EIGRP Support	No	Yes	Yes
BFD - Static Route Support over IPv4	No	Yes	Yes

Table 5 LAN Base, IP Base, and Enterprise Services Image Support on the Catalyst 4500 Series Switch

Feature	LAN Base	IP Base	Enterprise Services
BFD IPv6 Encapsulation Support	No	Yes	Yes
BGP Support for BFD	No	No	Yes
BGP	No	No	Yes
BGP 4	No	No	Yes
BGP 4 4Byte ASN (CnH)	No	No	Yes
BGP 4 Multipath Support	No	No	Yes
BGP 4 Prefix Filter and In-bound Route Maps	No	No	Yes
BGP Conditional Route Injection	No	No	Yes
BGP Link Bandwidth	No	No	Yes
BGP Neighbor Policy	No	No	Yes
BGP Prefix-Based Outbound Route Filtering	No	No	Yes
BGP Route-Map Continue	No	No	Yes
BGP Route-Map Continue Support for Outbound Policy	No	No	Yes
BGP Route-Map Policy List Support	No	No	Yes
BGP Soft Reset	No	No	Yes
BGP Wildcard	No	No	Yes
Bidirectional PIM (IPv4 only)	No	Yes	Yes
BOOTP	Yes	Yes	Yes
Bootup GOLD	No	Yes	Yes
Broadcast/Multicast Suppression	Yes	Yes	Yes
Call Home	No	Yes	Yes
CDP/CDPv2	Yes	Yes	Yes
CFM	Yes	Yes	Yes
CGMP - Cisco Group Management Protocol	Yes	Yes	Yes
Cisco IOS Scripting w/Tcl	Yes	Yes	Yes
CiscoView Autonomous Device Manager (ADP)	Yes	Yes	Yes

Table 5 LAN Base, IP Base, and Enterprise Services Image Support on the Catalyst 4500 Series Switch

Feature	LAN Base	IP Base	Enterprise Services
CNS	Yes	Yes	Yes
Command Scheduler (Kron)	Yes	Yes	Yes
Community PVLAN support	No	Yes	Yes
Config File	Yes	Yes	Yes
Configuration Replace and Configuration Rollback	Yes	Yes	Yes
Configuration Rollback Confirmed Change	Yes	Yes	Yes
Copy Command	Yes	Yes	Yes
Console Access	Yes	Yes	Yes
Control Plane Policing (CoPP)	Yes	Yes	Yes
CoS to DSCP Map	Yes	Yes	Yes
CPU Optimization for Layer 3 Multicast Control Packets	Yes	Yes	Yes
Crashdump Enhancement[1]	Yes	Yes	Yes
DAI (Dynamic ARP Inspection)	Yes	Yes	Yes
DBL (Dynamic Buffer Limiting) - Active Queue Management	Yes	Yes	Yes
Debug Commands	Yes	Yes	Yes
Device Management	Yes	Yes	Yes
DHCPv6 Relay Agent notification for Prefix Delegation	No	Yes	Yes
DHCP Client	Yes	Yes	Yes
DHCP Server	Yes	Yes	Yes
DHCP Snooping	Yes	Yes	Yes
DHCPv6 Ethernet Remote ID option	No	Yes	Yes
Diagnostics Tools	Yes	Yes	Yes
Diffserv MIB	Yes	Yes	Yes
Digital Optical Monitoring (DOM)	Yes	Yes	Yes
DSCP to CoS Map	Yes	Yes	Yes
DSCP to egress queue mapping	Yes	Yes	Yes

Table 5 LAN Base, IP Base, and Enterprise Services Image Support on the Catalyst 4500 Series Switch

Feature	LAN Base	IP Base	Enterprise Services
DSCP/CoS via LLDP	Yes	Yes	Yes
Duplication Location Reporting Issue	No	Yes	Yes
Easy Virtual Network (EVN)	No	No	Yes
EIGRP	No	No	Yes
EIGRP Service Advertisement Framework	Yes	Yes	Yes
EIGRP Stub Routing	No	Yes	Yes
Embedded Event Manager (EEM) 3.2	No	Yes	Yes
Embedded Event Manager and EOT integration	No	Yes	Yes
Energywise Agentless SNMP support	Yes	Yes	Yes
Energywise Wake-On-Lan Support	Yes	Yes	Yes
EPoE	Yes	Yes	Yes
EtherChannel	Yes	Yes	Yes
Ethernet Management Port (Fa1 interface)[2]	Yes	Yes	Yes
Ethernet Operations, Administration, and Maintenance (OAM)	Yes	Yes	Yes
Event Log	Yes	Yes	Yes
FHRP - Enhanced Object Tracking of IP SLAs	Yes	No	Yes
FHRP - GLBP - IP Redundancy API	No	Yes	Yes
FHRP - HSRP - Hot Standby Router Protocol V2	No	Yes	Yes
FHRP - Object Tracking List	No	Yes	Yes
FIPS 140-2/3 Level 2 Certification	Yes	Yes	Yes
File Management	Yes	Yes	Yes
Flex Links+ (VLAN Load balancing)	Yes	Yes	Yes
Gateway Load Balancing Protocol (GLBP)	No	Yes	Yes
GOLD Online Diagnostics	Yes	Yes	Yes
HSRP - Hot Standby Router Protocol	No	Yes	Yes
HSRPv2 for IPv6 Global Address Support	No	Yes	Yes

Table 5 LAN Base, IP Base, and Enterprise Services Image Support on the Catalyst 4500 Series Switch

Feature	LAN Base	IP Base	Enterprise Services
HTTP TACAC+ Accounting support	Yes	Yes	Yes
Identity 4.1 ACL Policy Enhancements	Yes	Yes	Yes
Identity 4.2: MAB with Configurable User Name/Password	Yes	Yes	Yes
Identity 4.1 Network Edge Access Topology	Yes	Yes	Yes
ID 4.0 Voice Vlan assignment	Yes	Yes	Yes
ID 4.1 Filter ID and per use ACL	Yes	Yes	Yes
IEEE 802.1ab LLDP (Link Layer Discovery Protocol)	Yes	Yes	Yes
IEEE 802.1ab LLDP/LLDP-MED	Yes	Yes	Yes
IEEE 802.1ab LLDP enhancements (PoE+Layer 2 COS)	Yes	Yes	Yes
IEEE 802.1ag D8.1 standard Compliant CFM, Y.1731 multicast LBM / AIS / RDI / LCK, IP SLA for Ethernet	Yes	Yes	Yes
IEEE 802.1p Support	Yes	Yes	Yes
IEEE 802.1p Prioritization	Yes	Yes	Yes
IEEE 802.1p/802.1q	Yes	Yes	Yes
IEEE 802.1Q Tunneling	Yes	Yes	Yes
IEEE 802.1Q VLAN Trunking	Yes	Yes	Yes
IEEE 802.1s Multiple Spanning Tree (MST) Standard Compliance	Yes	Yes	Yes
IEEE 802.1w Spanning Tree Rapid Reconfiguration	Yes	Yes	Yes
IEEE 802.1x (Auth-Fail VLAN, Accounting)	Yes	Yes	Yes
IEEE 802.1x Critical Authorization for Voice and Data	Yes	Yes	Yes
IEEE 802.1x Flexible Authentication	Yes	Yes	Yes
IEEE 802.1x with Multiple authenticated, multi-host	Yes	Yes	Yes
IEEE 802.1x Open Authentication	Yes	Yes	Yes
IEEE 802.1x with User Distribution	Yes	Yes	Yes
IEEE 802.1x User Port Description	Yes	Yes	Yes
IEEE 802.1x VLAN Assignment)	Yes	Yes	Yes

Table 5 LAN Base, IP Base, and Enterprise Services Image Support on the Catalyst 4500 Series Switch

Feature	LAN Base	IP Base	Enterprise Services
IEEE 802.1x VLAN User Group Distribution	Yes	Yes	Yes
IEEE 802.1x Wake on LAN	Yes	Yes	Yes
IEEE 802.1x Agentless Audit Support	Yes	Yes	Yes
IEEE 802.1x Authenticator	Yes	Yes	Yes
IEEE 802.1x Fallback support	Yes	Yes	Yes
IEEE 802.1x Guest VLAN	Yes	Yes	Yes
IEEE 802.1x MIB Support	Yes	Yes	Yes
IEEE 802.1x Multi-Domain Auth with Voice VLAN Assignment	Yes	Yes	Yes
IEEE 802.1x Multi-Domain Authentication	Yes	Yes	Yes
IEEE 802.1x Private Guest VLAN	Yes	Yes	Yes
IEEE 802.1x Private VLAN Assignment	Yes	Yes	Yes
IEEE 802.1x RADIUS Accounting	Yes	Yes	Yes
IEEE 802.1x Radius-Supplied Session Timeout	Yes	Yes	Yes
IEEE 802.1x and MAB with ACL assignment	Yes	Yes	Yes
IEEE 802.3ad Link Aggregation (LACP)	Yes	Yes	Yes
IEEE 802.3ad Link Aggregation (LACP) Port-Channel Standalone Disable	Yes	Yes	Yes
IEEE 802.3ah and CFM Interworking	No	Yes	Yes
IEEE 802.3x Flow Control	Yes	Yes	Yes
IEEE 802.1x Web-Auth	Yes	Yes	Yes
IGMP Filtering	Yes	Yes	Yes
IGMP Querier	Yes	Yes	Yes
IGMP Snooping	Yes	Yes	Yes
IGMP Version 1	Yes	Yes	Yes
IGMP Version 2	Yes	Yes	Yes
IGMP Version 3	Yes	Yes	Yes

Table 5 LAN Base, IP Base, and Enterprise Services Image Support on the Catalyst 4500 Series Switch

Feature	LAN Base	IP Base	Enterprise Services
IGMPv3 Host Stack	Yes	Yes	Yes
Ingress Policing	Yes	Yes	Yes
Interface Access (Telnet, Console/Serial, Web)	Yes	Yes	Yes
IOS Based Device Profiling	No	Yes	Yes
IP Enhanced IGRP Route Authentication	No	No	Yes
IP Event Dampening	Yes	Yes	Yes
IP Multicast Load Splitting across Equal-Cost Paths	No	Yes	Yes
IP Named Access Control List	Yes	Yes	Yes
IPv6 Tunnels (in software)	Yes	Yes	Yes
IP Routing	Yes	Yes	Yes
IP SLAs DHCP Operation	No	Yes	Yes
IP SLAs Distribution of Statistics	No	Yes	Yes
IP SLAs DNS Operation	No	Yes	Yes
IP SLAs FTP Operation	No	Yes	Yes
IP SLAs History Statistics	No	Yes	Yes
IP SLAs HTTP Operation	No	Yes	Yes
IP SLAs ICMP Echo Operation	No	Yes	Yes
IP SLAs ICMP Path Echo Operation	No	Yes	Yes
IP SLAs Multi Operation Scheduler	No	Yes	Yes
IP SLAs One Way Measurement	No	Yes	Yes
IP SLAs Path Jitter Operation	No	Yes	Yes
IP SLAs Random Scheduler	No	Yes	Yes
IP SLAs Reaction Threshold	No	Yes	Yes
IP SLAs Responder	Yes	Yes	Yes
IP SLAs Scheduler	No	Yes	Yes
IP SLAs SNMP Support	No	Yes	Yes

Table 5 LAN Base, IP Base, and Enterprise Services Image Support on the Catalyst 4500 Series Switch

Feature	LAN Base	IP Base	Enterprise Services
IP SLAs Sub-millisecond Accuracy Improvements	No	Yes	Yes
IP SLAs TCP Connect Operation	No	Yes	Yes
IP SLAs UDP Based VoIP Operation	No	Yes	Yes
IP SLAs UDP Echo Operation	No	Yes	Yes
IP SLAs UDP Jitter Operation	No	Yes	Yes
IP SLAs Video Operations	No	Yes	Yes
IP SLAs VoIP Threshold Traps	No	Yes	Yes
IP Unnumbered for VLAN-SVI interfaces	No	Yes	Yes
IPsecv3/IKEv2 (for management traffic only)	Yes	Yes	Yes
IPSG (IP Source Guard) v4	Yes	Yes	Yes
IPSG (IP Source Guard) v4 for Static Hosts	Yes	Yes	Yes
IPv4 Policy-Based Routing (PBR)	No	Yes	Yes
IPv4 Policy-Based Routing (PBR) Recursive Next Hop	No	Yes	Yes
IPv6 / v4 BFD with OSPF/ BGP/ EIGRP and Static	No	Yes	Yes
IPv6 Bootstrap Router (BSR) Scoped Zone Support	No	No	Yes
IPv6 First Hop Security (FHS): DHCPv6 Guard Lightweight DHCPv6 Relay Agent IPv6 Destination Guard IPv6 Snooping IPv6 Neighbor Discovery Multicast Suppression IPv6 Router Advertisement (RA) Guard	Yes	Yes	Yes
IPv6 First Hop Security (FHS) Phase 2: Binding table recovery Bulk Lease Query support from Lightweight DHCPv6 Relay Agent (LDRA) Neighbor Discovery (ND) Multicast Suppress Source & Prefix Guard[3]	Yes	Yes	Yes
IPv6 HSRP	No	Yes	Yes

Table 5 LAN Base, IP Base, and Enterprise Services Image Support on the Catalyst 4500 Series Switch

Feature	LAN Base	IP Base	Enterprise Services
IPv6 Interface Statistics	Yes	Yes	Yes
IPv6 IP SLAs (UDP Jitter, UDP Echo, ICMP Echo, TCP Connect)	No	Yes	Yes
IPv6 (Internet Protocol Version 6)	Yes	Yes	Yes
IPV6 MLD snooping V1 and V2	Yes	Yes	Yes
IPv6 Multicast	No	Yes	Yes
IPv6 Multicast: Bootstrap Router (BSR)	No	Yes	Yes
IPv6 Multicast: Multicast Listener Discovery (MLD) Protocol, Versions 1 and 2	No	Yes	Yes
IPv6 Multicast: PIM Accept Register	No	Yes	Yes
IPv6 Multicast: PIM Source-Specific Multicast (PIM-SSM)	No	Yes	Yes
IPv6 Multicast: PIM Sparse Mode (PIM-SM)	No	Yes	Yes
IPv6 Multicast: Routable Address Hello Option	No	Yes	Yes
IPv6 Neighbor Discovery	No	Yes	Yes
IPv6 OSPFv3 Fast Convergence	No	Yes[4]	Yes
IPv6 OSPFv3 NSF/SSO	No	Yes[4]	Yes
Identity 4.1 Network Edge Access Topology	Yes	Yes	Yes
IPv6 RA Guard (Host Mode)	Yes	Yes	Yes
IPv6 Reformation	NA	Yes	Yes
IPv6 Routing - EIGRP Support	No	No	Yes
IPv6 Routing: OSPF for IPv6 (OSPFv3)	No	Yes[4]	Yes
IPv6 Routing: RIP for IPv6 (RIPng)	No	Yes	Yes
IPv6 Switching: CEFv6 Switched Automatic IPv4-compatible Tunnels (in software)	No	Yes	Yes
IPv6 Switching: CEFv6 Switched Configured IPv6 over IPv4 Tunnels (in software)	No	Yes	Yes
IPv6 Switching: CEFv6 Switched ISATAP Tunnels (in software)	No	Yes	Yes
IPv6 Tunneling: Automatic 6to4 Tunnels (in software)	No	Yes	Yes

Table 5 LAN Base, IP Base, and Enterprise Services Image Support on the Catalyst 4500 Series Switch

Feature	LAN Base	IP Base	Enterprise Services
IPv6 Tunneling: Automatic IPv4-compatible Tunnels (in software)	No	Yes	Yes
IPv6 Tunneling: IPv6 over IPv4 GRE Tunnels (in software)	No	Yes	Yes
IPv6 Tunneling: ISATAP Tunnel Support (in software)	No	Yes	Yes
IPv6 Tunneling: Manually Configured IPv6 over IPv4 Tunnels (in software)	No	Yes	Yes
IPv6 Virtual LAN Access Control List	Yes	Yes	Yes
ISIS for IPv4 and IPv6	No	No	Yes
ISL Trunk	Yes	Yes	Yes
ISSU (IOS In-Service Software Upgrade)	No	Yes	Yes
Jumbo Frames	Yes	Yes	Yes
Layer 2 Control Packet	Yes	Yes	Yes
Layer 2 Protocol Tunneling (L2PT)	No	Yes	Yes
Layer 2 Traceroute	Yes	Yes	Yes
Layer 3 Multicast Routing (PIM SM, SSM, Bidir)	No	Yes	Yes
Link State Tracking	Yes	Yes	Yes
Local Web Auth	Yes	Yes	Yes
MAB (MAC Authentication Bypass) for Voice VLAN	Yes	Yes	Yes
MAC Address Filtering	Yes	Yes	Yes
MAC Based Access List	Yes	Yes	Yes
MAC Move and Replace	Yes	Yes	Yes
Medianet 2.0: AutoQoS SRND4 Macro	No	Yes	Yes
Medianet 2.0: Integrated Video Traffic Simulator (hardware-assisted IP SLA); IPSLA responder only	No	Yes	Yes
Medianet 2.0: Flow Metadata	No	Yes	Yes
Medianet 2.0: Media Service Proxy	No	Yes	Yes
Medianet 2.0: Media Monitoring (Performance Monitoring and Mediatrace)	No	Yes	Yes

Table 5 LAN Base, IP Base, and Enterprise Services Image Support on the Catalyst 4500 Series Switch

Feature	LAN Base	IP Base	Enterprise Services
Medianet 2.0: MSP and Metadata	No	No	Yes
Multicast BGP (MBGP)	No	No	Yes
Multicast HA (NSF/SSO) for IPv4&IPv6	No	Yes	Yes
Multicast Routing Monitor (MRM)	No	Yes	Yes
Multicast Source Discovery Protocol (MSDP)	Yes	Yes	Yes
Multicast VLAN Registration (MVR)	Yes	Yes	Yes
Multi-authentication and VLAN Assignment	Yes	Yes	Yes
Multi-VRF Support (VRF lite)	No	No	Yes
NAC - L2 IEEE 802.1x	Yes	Yes	Yes
NAC - L2 IP	Yes	Yes	Yes
ND Cache Limit/Interface	No	Yes	Yes
NEAT Enhancement: Re-Enabling BPDU Guard Based on User Configuration	Yes	Yes	Yes
Network Edge Access Topology (NEAT)	Yes	Yes	Yes
Network Time Protocol (NTP)	Yes	Yes	Yes
NMSP Enhancements • GPS support for location • Location at switch level • Local timezone change • Name value pair • Priority settings for MIBs	No	Yes	Yes
Time Protocols (SNTP, TimeP) master	Yes	Yes	Yes
No. of QoS Filters No. of Security ACE	Yes (4K entries)	Yes	Yes
No Service Password Recovery	Yes	Yes	Yes
No. of VLAN Support	2048	4096	4096
NSF - BGP	No	No	Yes
NSF - EIGRP	No	Yes	Yes

Table 5 LAN Base, IP Base, and Enterprise Services Image Support on the Catalyst 4500 Series Switch

Feature	LAN Base	IP Base	Enterprise Services
NSF - OSPF (version 2 only)	No	Yes	Yes
NSF/SSO (Nonstop Forwarding with Stateful Switchover)	No	No	Yes
NTP for IPv6	Yes	Yes	Yes
NTP for VRF aware	No	No	Yes
On Demand Routing (ODR)	No	No	Yes
OSPF	No	Yes[4]	Yes
OSPF v3 Authentication	No	Yes[4]	Yes
OSPF Flooding Reduction	No	Yes[4]	Yes
OSPF for Routed Access[5]	No	Yes	Yes
OSPF Incremental Shortest Path First (i-SPF) Support	No	Yes[4]	Yes
OSPF Link State Database Overload Protection	No	Yes[4]	Yes
OSPF Not-So-Stubby Areas (NSSA)	No	Yes[4]	Yes
OSPF Packet Pacing	No	Yes[4]	Yes
OSPF Shortest Paths First Throttling	No	Yes[4]	Yes
OSPF Stub Router Advertisement	No	Yes[4]	Yes
OSPF Support for Fast Hellos	No	Yes[4]	Yes
OSPF Support for Link State Advertisement (LSA) Throttling	No	Yes[4]	Yes
OSPF Support for Multi-VRF on CE Routers	No	Yes[4]	Yes
OSPF Update Packet-Pacing Configurable Timers	No	Yes[4]	Yes
Out-of-band Management Port	Yes	Yes	Yes
Out-of-band Management Port - IPv6	Yes	Yes	Yes
PAgP	Yes	Yes	Yes
Passwords Password clear protection	Yes	Yes	Yes
Per Intf IGMP State Limit	Yes	Yes	Yes
Per Intf MrouteState Limit	Yes	Yes	Yes

Table 5 LAN Base, IP Base, and Enterprise Services Image Support on the Catalyst 4500 Series Switch

Feature	LAN Base	IP Base	Enterprise Services
Per-User ACL Support for 802.1X/MAB/Webauth users	Yes	Yes	Yes
Per-VLAN Learning	Yes	Yes	Yes
PIM Sparse Mode Version4	No	Yes	Yes
PIM Version 1	No	Yes	Yes
PM Version 2	No	Yes	Yes
PoE (up to 15.4W only)	Yes	Yes	Yes
PoE+ Ready	Yes	Yes	Yes
PoEP via LLDP	Yes	Yes	Yes
Port Access Control List (PACL)	Yes	Yes	Yes
Port Monitoring (interface Stats)	Yes	Yes	Yes
Port Security	Yes (supports 1024 MACs)	Yes (supports 3072 MACs)	Yes (supports 3072 MACs)s
Post Status	Yes	Yes	Yes
Pragmatic General Multicast (PGM)	Yes	Yes	Yes
Private VLANs	Yes	Yes	Yes
Propagation of Location Info over CDP	Yes	Yes	Yes
PVLAN over EtherChannel	Yes	Yes	Yes
PVST+ (Per Vlan Spanning Tree Plus)	Yes	Yes	Yes
Q-in-Q	Yes	Yes	Yes
RACL	Yes	Yes	Yes
RADIUS/TACACS+ (AAA)	Yes	Yes	Yes
RADIUS Attribute 44 (Accounting Session ID) in Access Requests	Yes	Yes	Yes
RADIUS Change of Authorization	Yes	Yes	Yes
Rapid-Per-VLAN-Spanning Tree (Rapid-PVST)	Yes	Yes	Yes
Remote SPAN (RSPAN)	Yes	Yes	Yes
REP (Resilient Ethernet Protocol)	Yes	Yes	Yes

Table 5 LAN Base, IP Base, and Enterprise Services Image Support on the Catalyst 4500 Series Switch

Feature	LAN Base	IP Base	Enterprise Services
REP - No Edge Neighbor Enhancement	Yes	Yes	Yes
RIP v1	No	Yes	Yes
RMON	Yes	Yes	Yes
Role-Based Access Control CLI commands (RBAC)	Yes	Yes	Yes
RPR	Yes	Yes	Yes
RPVST+	Yes	Yes	Yes
RSPAN	Yes	Yes	Yes
Secure Copy (SCP)	Yes	Yes	Yes
Secure Shell SSH Version 1, 2 Server Support	Yes	Yes	Yes
Secure Shell SSH Version 1, 2 Client Support	Yes	Yes	Yes
Service Advertisement Framework (SAF)	No	No	Yes
Smart Install Director—Configuration-only Deployment and Smooth Upgrade	Yes	Yes	Yes
SmartPorts (Role based MACRO)	Yes	Yes	Yes
SNMP (Simple Network Management Protocol)	Yes	Yes	Yes
SNMPv3 (SNMP Version 3)	Yes	Yes	Yes
Source Port Filtering (Private VLAN)	Yes	Yes	Yes
Source Specific Multicast (SSM)	No	Yes	Yes
Source Specific Multicast (SSM) - IGMPv3,IGMP v3lite, and URD	Yes	Yes	Yes
Source Specific Multicast (SSM) Mapping	Yes	Yes	Yes
SPAN (# of sessions) – Port Mirroring	Yes (4 sessions)	Yes (16 bidirectional sessions)	Yes (16 bidirectional sessions)
SPAN ACL Filtering for IPv6	Yes	Yes	Yes
SSHv2/Secure Copy, FTP, SSL, Syslog, Sys Information	Yes	Yes	Yes
SSO (Stateful SwitchOver)	No	Yes	Yes
Static Route Support for BFD over IPv6	No	No	Yes

Table 5 LAN Base, IP Base, and Enterprise Services Image Support on the Catalyst 4500 Series Switch

Feature	LAN Base	IP Base	Enterprise Services
Static Routing (IPv4/IPv6)	Yes	Yes	Yes
Storm Control - Per-Port Multicast Suppression	Yes	Yes	Yes
Stub IP Multicast Routing	No	Yes	No
Sub-second UDLD	Yes	Yes	Yes
SVI (Switch Virtual Interface) Autostate Exclude	Yes	Yes	Yes
TACACS+	Yes	Yes	Yes
TACACS+ and Radius for IPv6-	Yes	Yes	Yes
Time-Based Access Lists	Yes	Yes	Yes
Time Domain Reflectometry (TDR)[6]	No	Yes	Yes
Time Protocols (SNTP, TimeP)	Yes	Yes	Yes
Traffic Mirroring (SPAN)	Yes	Yes	Yes
Trusted Boundary (LLDP & CDP Based)	Yes	Yes	Yes
TrustSec SGT/ SGA	No	Yes	Yes
Unicast Reverse Path Forwarding (uRPF)	Yes	Yes	Yes
UniDirectional Link Detection (UDLD)	Yes	Yes	Yes
Virtual Router Redundancy Protocol (VRRP) for IPv4	No	Yes	Yes
VLAN Access Control List (VACL)	Yes	Yes	Yes
VLAN Mapping (VLAN Translation)	No	Yes	Yes
Voice VLAN	Yes	Yes	Yes
VRF-aware TACACS+	No	No	Yes
VRF-lite for IPv6 on OSPF/ BGP/ EIGRP	No	No	Yes
VTP (Virtual Trunking Protocol) Version 2	Yes	Yes	Yes
VTP version 3	Yes	Yes	Yes
WCCP Redirection on Inbound Interfaces	No	Yes	Yes
WCCP Version 2	No	Yes	Yes
XML-PI	Yes	Yes	Yes

1. Supported only on Supervisor Engine 6-E and Supervisor Engine 6L-
2. Starting with Cisco IOS Release 12.2(46)SG
3. When either Source or Prefix Guard for IPv6 is enabled, ICMPv6 packets are unrestricted on all Catalyst 4500 series switch platforms running IOS Cisco Release 15.2(1)E. All other traffic types are restricted.
4. IP Base supports only one OSPFv2 and one OSPFv3 instance with a maximum number of 200 dynamically learned routes.
5. OSPF for Routed Access supports only one OSPFv2 and one OSPFv3 instance with a maximum number of 1000 dynamically learned routes.
6. TDR is not supported on 46xx linecards.

Note You can purchase a special license to enable the 10 Gigabit uplinks in the LAN Base image without moving to IP Base.

MIB Support

For information on MIB support, please refer to this URL:

ftp://ftp.cisco.com/pub/mibs/supportlists/cat4000/cat4000-supportlist.html

Features Not Supported on the Cisco Catalyst 4500 Series Switch

- BFD for IPv6 EIGRP and IPv6 BGP in any 3.4.0SG images including SG4 (to be released in May-June, 2014).
- The following ACL types:
  - Standard Xerox Network System (XNS) access list
  - Extended XNS access list
  - DECnet access list
  - Protocol type-code access list
- ADSL and Dial access for IPv6
- AppleTalk EIGRP
- Bridge groups
- CEF Accounting
- Cisco IOS software IPX ACLs:
  - <1200-1299> IPX summary address access list
- Cisco IOS software-based transparent bridging (also called “fallback bridging”)
- Connectionless (CLNS) routing; including IS-IS routing for CLNS. IS-IS is supported for IP routing only.
- DLSw (data-link switching)
- IGRP (use EIGRP instead)
- **isis network point-to-point** command
- Kerberos support for access control
- LLDP HA
- Lock and key

- NAT-PT for IPv6
- NetFlow per-VRF
- PBR with Multiple Tracking Options
- QoS for IPv6 traffic (only supported on Supervisor 6)
- Reflexive ACLs
- Routing IPv6 over an MPLS network
- WCCP version 1
- CFM CoS
- PBR with EOT

Orderable Product Numbers

Table 6 Orderable Product Numbers for the Catalyst 4500 Series Switch

Product Number	Description	Image
S45EESU-15201E	Cisco CAT4500E IOS ENTERPRISE SERVICES UPGRADE W/O CRYPTO	cat4500e-entservices-mz.152-1.E.bin
S45EES-15201E	Cisco CAT4500E IOS ENTERPRISE SERVICES W/O CRYPTO	cat4500e-entservices-mz.152-1.E.bin
S45EESK9-15201E	Cisco CAT4500E IOS ENTERPRISE SERVICES SSH	cat4500e-entservicesk9-mz.152-1.E.bin
S45EESUK9-15201E	Cisco CAT4500E IOS ENTERPRISE SERVICES UPGRADE SSH	cat4500e-entservicesk9-mz.152-1.E.bin
S45EIPBU-15201E	Cisco CAT4500E IOS IP BASE UPGRADE W/O CRYPTO	cat4500e-ipbase-mz.152-1.E.bin
S45EIPB-15201E	Cisco CAT4500E IOS IP BASE W/O CRYPTO	cat4500e-ipbase-mz.152-1.E.bin
S45EIPBK9-15201E	Cisco CAT4500E IOS IP BASE SSH	cat4500e-ipbasek9-mz.152-1.E.bin
S45EIBUK9-15201E	Cisco CAT4500E IOS IP BASE UPGRADE SSH	cat4500e-ipbasek9-mz.152-1.E.bin
S45ELB-15201E	Cisco CAT4500E IOS LAN BASE W/O CRYPTO	cat4500e-lanbase-mz.152-1.E.bin
S45ELBK9-15201E	Cisco CAT4500E IOS LAN BASE SSH	cat4500e-lanbasek9-mz.152-1.E.bin

New and Changed Information

These sections describe the new and changed information for the Catalyst 4500 series switch running Cisco IOS software:

- New Hardware Features in Release 15.2(1)E, page 26
- New Software Features in Release 15.2(1)E, page 26

New Hardware Features in Release 15.2(1)E

- GLC-T
- SFP+DWDM
- WS-X4640-CSFP-E on 10-Slot Catalyst 4500E Chassis

New Software Features in Release 15.2(1)E

4 byte BGP ASN numbers

BFD v4 and v6

- BFD Infra (vrf aware, v4 + v6)
- BGP Client for BFD
- OSPFv2 Client for BFD
- EIGRP Client for BFD
- Static Route Client for BFD
- Static Route support for BFD over IPv6

BGP

- malformed attribute error handling
- Cisco-BGP-MIBv2
- Graceful Shutdown
- Add-Path
- VRF dynamic route leaking (for VRF lite)

Binding Integrity Guard (chassis)

Configurable TCP Keep Alive Timer

DCM 2.0

DHCP Glean

DHCPv6 Relay Chaining and Route Insertion

Diffserv MIB (RFC 3289) support

Disable IPX in EIGRP

DNS IPv6 Transport for DNS

EIGRP add-path

EIGRP New Release Enablement

- EIGRP IPv6 NSF/GR
- EIGRP MIB
- EIGRP IPv6 MIBs

EIGRP Wide Metrics (Existing)

Encrypt “PMK” password inside the switch (**show** commands etc.).

Energywise Agentless SNMP support

Energywise Wake-On-Lan Support

Enhancement to create global IPv6 entries for unsolicited NA

Generate SNMP trap when EIGRP neighbor down

Hop by Hop EH ACL Throttling

HSRP aware PIM

IPv6 Compliance Features (JITC, USGv6)

- Updated ICMP RFCs 4291, 4443, 3484, 2526, 4861, 4862, 5095, 4007, 3513
- UDP MIB (RFC 4113) and TCP MIB (RFC 4022) support
- VRRP over IPv6 (Existing)

IPv6 Duplicate Address Detection (DAD) proxy

IPv6 First Hop Security Phase II

- Binding table recovery
- Bulk Lease Query support from Lightweight DHCPv6 Relay Agent (LDRA)
- Neighbor Discovery (ND) Multicast Suppress
- Prefix Guard
- Source Guard

Note When either Source or Prefix Guard for IPv6 is enabled, ICMPv6 packets are unrestricted on all Catalyst 4500 series switch platforms running IOS Cisco Release 15.2(1)E. All other traffic types are restricted.

Ipv6 nd cache expire

IPv6 Neighbor Discovery Multicast Suppress

IPv6 support for TFTP

Manually Configured Tunnel over IPv4

Multicast VLAN Registration (MVR)

Manually Configured Tunnel over IPv4

mDNS Bonjour Support

MIB Gaps

- CISCO-EMBEDDED-EVENT-MGR-MIB
- SNMP-COMMUNITY-MIB

ND Multicast Suppress

Need option to configure exponential backoff for NS timer used in NUD

Netconf XML PI show output

New AutoQoS Show Commands

OSPF feature enablement

- OSPFv2 NSR
- OSPFv3 NSR
- OSPFv3 BFD

- OSPFv3 Graceful Shutdown
- OSPFv2 NSSA
- OSPFv3 NSSA Option
- OSPFv3 External Path Preference
- OSPFv3 Router Max metric Router LSA
- OSPFv3 Retransmission Limit

OSPFv3 Area Filter/DC Ignore

OSPFv3 MIB, OSPF MIB

OSPFv3 Prefix Suppression

Performance Monitor Synchronization

RA Guard

Route Tag Enhancements

Script based zero touch provisioning

Smart Install Configuration-Only Deployment

SMI Image only upgrade

Smart Install Upgrade Fallback

VRF-aware OSPFv3,EIGRPv6, and BGPv6

- VRF-Lite for OSPFv3
- VRF-Lite for IPv6 EIGRP
- VRF-Lite for BGPv6

VRF aware SSH

VRF aware TACACS+

VRF aware DNS Support

New and Modified IOS Software Features Supported in Cisco IOS 15.2(1)E

The following new and modified software features are supported in Cisco IOS Release 15.2(1)E.

New Features:

eEdge integration with MACSEC

http://www.cisco.com/en/US/docs/ios-xml/ios/san/configuration/15-e/san-macsec.html

DHCP Gleaning

http://www.cisco.com/en/US/docs/ios-xml/ios/ipaddr_dhcp/configuration/15-e/dhcp-gleaning.html

http://www.cisco.com/en/US/docs/ios-xml/ios/ipaddr_dhcp/configuration/xe-3e/dhcp-xe-3e-book.html

Service Discovery Gateway

http://www.cisco.com/en/US/docs/ios-xml/ios/ipaddr_dns/configuration/15-e/dns-15-e-book.html

802.1X support for trunk ports

http://www.cisco.com/en/US/docs/ios-xml/ios/sec_usr_8021x/configuration/15-e/config-ieee-802x-pba.html

http://www.cisco.com/en/US/docs/ios-xml/ios/sec_usr_8021x/configuration/xe-3e/sec-usr-8021x-xe-3e-book.html

Enhancements/Respins:

Commented IP Access List Entries

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/15-e/sec-acl-comm-ipacl.html

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/xe-3e/sec-acl-comm-ipacl.html

IPv6 ACL Extensions for Hop by Hop Filtering

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/15-e/ip6-acl-ext-hbh.html

ACL Sequence Numbering

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/15-e/sec-acl-seq-num.html

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/xe-3e/sec-acl-seq-num.html

ACL Support for Filtering IP Options

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/15-e/sec-acl-support-filter-ip-option.html

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/xe-3e/sec-acl-support-filter-ip-option.html

ACL - TCP Flags Filtering

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/15-e/sec-create-filter-tcp.html

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/xe-3e/sec-create-filter-tcp.html

ACL - Named ACL Support for Noncontiguous Ports on an Access Control Entry

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/15-e/sec-named-acl-support-for-non-contiguous-ports.html

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/xe-3e/sec-named-acl-support-for-non-contiguous-ports.html

IP Access List Entry Sequence Numbering

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/15-e/sec-acl-seq-num.html

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/xe-3e/sec-acl-seq-num.html

IOS ACL Support for filtering IP Options

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/15-e/sec-acl-support-filter-ip-option.html

ACL syslog Correlation

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/15-e/sec-acl-syslog.html

IP Named Access Control List

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/15-e/sec-acl-named.html

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/xe-3e/sec-acl-named.html

IPv6 PACL support

http://cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/15-e/ip6-pacl-supp.html

Cisco Data Collection Manager

http://www.cisco.com/en/US/docs/ios-xml/ios/bsdcm/configuration/15-e/bsdcm-15-e-book.html

SNMPv3 Community MIB Support

http://www.cisco.com/en/US/docs/ios-xml/ios/snmp/configuration/15-e/snmp-15-e-book.html

http://www.cisco.com/en/US/docs/ios-xml/ios/snmp/configuration/xe-3e/snmp-xe-3e-book.html

NETCONF XML PI

http://www.cisco.com/en/US/docs/ios-xml/ios/cns/configuration/15-e/cns-15-e-book.html

IPv6 PIM Passive

http://www.cisco.com/en/US/docs/ios-xml/ios/ipmulti_pim/configuration/15-e/ip6-mcast-pim-pass.html

HSRP aware PIM

http://www.cisco.com/en/US/docs/ios-xml/ios/ipmulti_pim/configuration/15-e/imc_hsrp_aware.html

OSPFv3 ABR Type 3 LSA Filtering

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_ospf/configuration/15-e/iro-abr-type-3.html

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_ospf/configuration/15-e/iro-ospfv3-dc-ignore.html

Graceful Shutdown Support for OSPFv3

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_ospf/configuration/15-e/iro-ospfv3-gshutdown.html

OSPF Support for BFD over IPv4

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_bfd/configuration/15-e/irbfd-bfd-ospf-ipv4-supp.html

BFD - VRF Support

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_bfd/configuration/15-e/irbfd-vrf-supp.html

BFD - Static Route Support

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_bfd/configuration/15-e/irbfd-bfd-static-route-supp.html

Static Route Support for BFD over IPv6

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_bfd/configuration/15-e/ip6-bfd-static.html

BFD - EIGRP Support

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_bfd/configuration/15-e/irbfd-bfd-eigrp-supp.html

OSPFv3 BFD

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_bfd/configuration/15-e/ip6-route-bfd-ospfv3.html

TACACS+ Per VRF

http://www.cisco.com/en/US/docs/ios-xml/ios/sec_usr_tacacs/configuration/15-e/sec-usr-tacacs-15-e-book.html

SSHv2 Enhancements

http://www.cisco.com/en/US/docs/ios-xml/ios/sec_usr_ssh/configuration/15-e/sec-secure-shell-v2.html

Client Information Signalling Protocol (CISP)

http://www.cisco.com/en/US/docs/ios-xml/ios/sec_usr_8021x/configuration/15-e/sec-ieee-neat.html

OSPFv3 MIB

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_ospf/configuration/15-e/iro-ospfv3-mib.html

OSPF Non-stop Routing

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_ospf/configuration/15-e/iro-nsr-ospf.html

OSPFv3 Max-Metric Router-Lsa

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_ospf/configuration/15-e/ip6-route-ospfv3-max-lsa.html

OSPFv3 VRF-Lite/PE-CE

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_ospf/configuration/15-e/iro-vrf-lite-pe-ce.html

VRRPv3 Protocol Support

http://www.cisco.com/en/US/docs/ios-xml/ios/ipapp_fhrp/configuration/15-e/fhp-15-e-book_chapter_0100.html

IPv6 Source/Prefix Guard

http://www.cisco.com/en/US/docs/ios-xml/ios/ipv6_fhsec/configuration/15-e/ip6f-15-e-book_chapter_0110.html

IPv6 Router Advertisement Throttler

http://www.cisco.com/en/US/docs/ios-xml/ios/ipv6_fhsec/configuration/15-e/ip6f-15-e-book_chapter_0111.html

IPv6 Neighbor Discovery Multicast Suppress

http://www.cisco.com/en/US/docs/ios-xml/ios/ipv6_fhsec/configuration/15-e/ip6-nd-mcast-supp.html

IPv6 Destination Guard

http://www.cisco.com/en/US/docs/ios-xml/ios/ipv6_fhsec/configuration/15-e/ipv6-dest-guard.html

DHCPv6 Relay - Lightweight DHCPv6 Relay Agent

http://www.cisco.com/en/US/docs/ios-xml/ios/ipaddr_dhcp/configuration/15-e/dhcp-ldra.html

DNS - VRF aware DNS

http://www.cisco.com/en/US/docs/ios-xml/ios/ipaddr_dns/configuration/15-e/dns-15-e-book_chapter_01.html

DHCPv6 - Relay chaining for Prefix Delegation

http://www.cisco.com/en/US/docs/ios-xml/ios/ipaddr_dhcp/configuration/15-e/dhcp-15e-book_chapter_010.html

OSPFv3 Retransmission Limits

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_ospf/command/ospf-i1.html

OSPFv3 RFC 3101 Support

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_ospf/configuration/15-e/iro-ospfv3-nssa-cfg.html

OSPF support for NSSA RFC 3101

http://www.cisco.com/en/US/docs/ios-xml/ios/iproute_ospf/configuration/15-e/iro-ospfv2-nssa-cfg.html

TFTP IPv6 support

http://www.cisco.com/en/US/docs/ios-xml/ios/ipv6_nman/configuration/15-e/ip6-tftp-supp.html

Capabilities Manager

http://www.cisco.com/en/US/docs/ios-xml/ios/saf/configuration/15-e/saf-capman.html

Extensible Messaging Client Protocol (XMCP) 2.0

http://www.cisco.com/en/US/docs/ios-xml/ios/saf/configuration/15-e/saf-xmcp.html

Upgrading the System Software

In most cases, upgrading the switch to a newer release of Cisco IOS software does not require a ROMMON upgrade. However, if you are running an early release of Cisco IOS software and plan to upgrade, refer to the following tables for the minimum Cisco IOS image and the recommended ROMMON release, respectively.

Note You must upgrade to at least ROMMON Release 12.2(44r)SG5 to run Cisco IOS Release 15.1(2)SG on the Supervisor Engine 6-E and Supervisor Engine 6L-E. 12.2(44r)SG9 is recommended.

Caution Most supervisor engines have the required ROMMON release. However, due to caveat CSCed25996, we recommend that you upgrade your ROMMON to the recommended release.

Table 7 Supervisor Engine and Recommended ROMMON Release

Supervisor Engine	Recommended ROMMON Release
6-E	12.2(44r)SG9
6L-E	12.2(44r)SG9

Table 8 ROMMON Release and Promupgrade Programs

ROMMON Release	Promupgrade Program
12.2(31r)SGA4	cat4500-e-ios-promupgrade-122_31r_SGA4
12.2(44r)SG5	cat4500-e-ios-promupgrade-122_44r_SG5
12.2(44r)SG9	cat4500-e-ios-promupgrade-122_44r_SG9
12.2(44r)SG10	cat4500-e-ios-promupgrade-122_44r_SG10

The following sections describe how to upgrade your switch software:

- Identifying an +E Chassis and ROMMON, page 34
- Upgrading the Cisco IOS Software, page 34

Identifying an +E Chassis and ROMMON

An +E chassis is identified by a FRU minor value in the chassis' idprom.

When supervisor engine 1 (sup1) is in ROMMON and supervisor engine 2 (sup2) is in IOS, only sup2 can read the idprom contents of chassis' idprom. Chassis type is displayed as "+E" in the output of the **show version** command. Conversely, sup1 can only display the chassis type as "E."

When both sup1 and sup2 are in ROMMON, both engines can read the chassis' idprom. Chassis type is displayed correctly as "+E" in the output of the **show version** command.

When both sup1 and sup2 are in IOS, both engines can read the chassis' idprom. Chassis type is displayed correctly as "+E" in the output of the **show version** command.

Upgrading the Cisco IOS Software

Caution To avoid actions that might make your system unable to boot, please read this entire section before starting the upgrade.

Before you proceed, observe the following rules for hostname:

- Do not expect case to be preserved

  Uppercase and lowercase characters look the same to many internet software applications. It may seem appropriate to capitalize a name the same way you might do in English, but conventions dictate that computer names appear all lowercase. For more information, refer to RFC 1178, Choosing a Name for Your Computer.
- Must start with a letter and end with a letter or digit.
- Interior characters can only be letters, digits, and hyphens; periods and underscores not allowed.
- Names must be 63 characters or fewer; hostname of fewer than 10 characters is recommended.
- On most systems, a field of 30 characters is used for the host name and the prompt in the CLI. Longer configuration mode prompts may be truncated.

To upgrade the Cisco IOS software on your Catalyst 4500 series switch, use this procedure:

Step 1 Download Cisco IOS Release 15.1(2)SG from Cisco.com, and place the image on a TFTP server in a directory that is accessible from the supervisor engine that is upgraded.

Step 2 Use the **dir bootflash:** command to ensure that there is sufficient space in Flash memory to store the **promupgrade** image. If there is insufficient space, delete one or more images, and then enter the **squeeze bootflash:** command to reclaim the space.

If you are using a CompactFlash card, use **slot0:** instead of **bootflash**.

Step 3 Download the software image into Flash memory using the **copy tftp** command.

The following example shows how to download the Cisco IOS software image cat4000-is-mz.121-12c.EW from the remote host 172.20.58.78 to bootflash:

```
Switch# copy tftp: bootflash:
Address or name of remote host [172.20.58.78]?
Source filename [cat4000-is-mz121_12c.EW]?
Destination filename [cat4000-is-mz.121-12c.EW]?
Accessing tftp://172.20.58.78/cat4000-is-mz.121-12c.EW...
Loading cat4000-is-mz.121-12c.EW from 172.20.58.78 (via
```

```
FastEthernet2/1):!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
|!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
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!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 6923388/13846528 bytes]

6923388 bytes copied in 72.200 secs (96158 bytes/sec)
Switch#
```

Step 4 Use the **no boot system flash bootflash:***file_name* command to clear the cat4000-is-mz.121-8a.EW file and to save the BOOT variable.

The following example shows how to clear the BOOT variable:

```
Switch# configure terminal
Switch(config)# no boot system flash bootflash:cat4000-is-mz.121-8a.EW
Switch(config)# exit
Switch# write
Building configuration...
Compressed configuration from 3641 to 1244 bytes [OK]
Switch#
```

Step 5 Use the **boot system flash** command to add the Cisco IOS software image to the BOOT variable.

The following example shows how to add the cat4000-is-mz.121-12c.EW image to the BOOT variable:

```
Switch# configure terminal
Switch(config)# boot system flash bootflash:cat4000-is-mz.121-12c.EW
Switch(config)# exit
Switch# write
Building configuration...
Compressed configuration from 3641 to 1244 bytes [OK]
Switch#
```

Step 6 Use the **config-register** command to set the configuration register to 0x2102.

The following example show how to set the second least significant bit in the configuration register:

```
Switch# configure terminal
Switch(config)# config-register 0x2102
Switch(config)# exit
Switch# write
Building configuration...
Compressed configuration from 3723 to 1312 bytes [OK]
Switch#
```

Step 7 Enter the **reload** command to reset the switch and load the software.

Caution No intervention is necessary to complete the upgrade. To ensure a successful upgrade, do not interrupt the upgrade process by performing a reset, power cycle, or OIR of the supervisor, for at least five minutes.

The following example shows the output from a successful upgrade followed by a system reset:

```
Switch# reload
Rommon reg: 0x2B004180

Upgrading FPGA...

Decompressing the image
############## [OK]

 ******************************************************
 *                                                    *
 * WS-X4014 FPGA Upgrade Utility For WS-X4014 Machines *
 *                                                    *
 * Copyright (c) 2002 by Cisco Systems, Inc.          *
 * All rights reserved.                               *
 *                                                    *
 ******************************************************

 Image size = 483.944 KBytes

 Maximum allowed size = 1023.75 KBytes


 Upgrading your FPGA image... DO NOT RESET the system
 unless instructed or upgrade of FPGA will fail !!!

 Beginning erase of 0x100000 bytes at offset 0x3d00000...  Done!

 Beginning write of fpga image  (0x78fb0 bytes at offset 0x3d00000)...

 This could take as little as 30 seconds or up to 2 minutes.
 Please DO NOT RESET!

 Success! FPGA image has been upgraded successfully.
 System will reset itself and reboot in about 15 seconds.
 0




 ********************************************************
 *                                                      *
 * Welcome to Rom Monitor for WS-X4014 System.          *
 * Copyright (c) 2002 by Cisco Systems, Inc.            *
 * All rights reserved.                                 *
 *                                                      *
 ********************************************************

 Rom Monitor Program Version 12.1(12r)EW

 Board type 1, Board revision 5
 Swamp FPGA revision 16, Dagobah FPGA revision 47


 MAC Address  : 00-30-85-XX-XX-XX
 IP Address   : 10.10.10.91
 Netmask      : 255.255.255.0
 Gateway      : 10.10.10.1
 TftpServer   : Not set.
 Main Memory  : 256 MBytes

 ***** The system will autoboot in 5 seconds *****
```

```
 Type control-C to prevent autobooting.
Switch#
```

Step 8 Use the **show version** command to verify that the new Cisco IOS release is operating on the switch.

Limitations and Restrictions

These sections list the limitations and restrictions for the current release of Cisco IOS software on the Catalyst 4500 series switch.

- Starting with Release IOS 15.1(1)SG, the seven RP restriction was removed.
- A Span destination of fa1 is not supported.
- The "keepalive" CLI is not supported in interface mode on the switch, although it will appear in the running configuration. This behavior has no impact on functionality.
- TDR is only supported on interfaces Gi1/1 through Gi1/48, at 1000BaseT under open or shorted cable conditions. TDR length resolution is +/- 10 m. If the cable is less than 10 m or if the cable is properly terminated, the TDR result displays "0" m. If the interface speed is not 1000BaseT, an "unsupported" result status displays. TDR results will be unreliable for cables extended with the use of jack panels or patch panels.
- The following guidelines apply to Fast UDLD:
  - Fast UDLD is disabled by default.
  - Configure fast UDLD only on point-to-point links between network devices that support fast UDLD.
  - You can configure fast UDLD in either normal or aggressive mode.
  - Do not enter the link **debounce** command on fast UDLD ports.
  - Configure fast UDLD on at least two links between each connected network device. This reduces the likelihood of fast UDLD incorrectly error disabling a link due to false positives.
  - Fast UDLD does not report a unidirectional link if the same error occurs simultaneously on more than one link to the same neighbor device.
- A XML-PI specification file entry does not return the desired CLI output.

  The outputs of certain commands, such as **show ip route** and **show access-lists**, contain non-deterministic text. While the output is easily understood, the output text does not contain strings that are consistently output. A general purpose specification file entry is unable to parse all possible output.

  Workaround (1):

  While a general purpose specification file entry may not be possible, a specification file entry might be created that returns the desired text by searching for text that is guaranteed to be in the output. If a string is guaranteed to be in the output, it can be used for parsing.

  For example, the output of the show ip access-lists SecWiz_Gi3_17_out_ip command is this:

```
Extended IP access list SecWiz_Gi3_17_out_ip
    10 deny ip 76.0.0.0 0.255.255.255 host 65.65.66.67
    20 deny ip 76.0.0.0 0.255.255.255 host 44.45.46.47
    30 permit ip 76.0.0.0 0.255.255.255 host 55.56.57.57
```

The first line is easily parsed because access list is guaranteed to be in the output:

```
    <Property name="access list" alias="Name" distance="1.0" length="-1" type="String"
/>
```

The remaining lines all contain the term host. As a result, the specification file may report the desired values by specifying that string. For example, this line

```
    <Property name="host" alias="rule" distance="s.1" length="1" type="String" />
```

will produce the following for the first and second rules

```
    <rule>
        deny
    </rule>
```

and the following for the third statement

```
    <rule>
        permit
    <rule>
```

Workaround (2):

Request the output of the **show running-config** command using NETCONF and parse that output for the desired strings. This is useful when the desired lines contain nothing in common. For example, the rules in this access list do not contain a common string and the order (three permits, then a deny, then another permit), prevent the spec file entry from using permit as a search string, as in the following example:

```
    Extended MAC access list MACCOY
        permit 0000.0000.ffef ffff.ffff.0000 0000.00af.bcef ffff.ff00.0000 appletalk
        permit any host 65de.edfe.fefe xns-idp
        permit any any protocol-family rarp-non-ipv4
        deny   host 005e.1e5d.9f7d host 3399.e3e1.ff2c dec-spanning
        permit any any
```

The XML output of **show running-config** command includes the following, which can then be parsed programmatically, as desired:

```
<mac><access-list><extended><ACLName>MACCOY</ACLName></extended></access-list></mac>
    <X-Interface> permit 0000.0000.ffef ffff.ffff.0000 0000.00af.bcef ffff.ff00.0000
appletalk</X-Interface>
    <X-Interface> permit any host 65de.edfe.fefe xns-idp</X-Interface>
    <X-Interface> permit any any protocol-family rarp-non-ipv4</X-Interface>
    <X-Interface> deny   host 005e.1e5d.9f7d host 3399.e3e1.ff2c
dec-spanning</X-Interface>
    <X-Interface> permit any any</X-Interface>
```

- Although the Catalyst 4500 series switch still supports legacy 802.1X commands used in Cisco IOS Release 12.2(46)SG and earlier releases (that is, they are accepted on the CLI), they do not display in the CLI help menu.
- Current IOS software cannot support filenames exceeding 64 characters.
- All software releases support a maximum of 32,768 IGMP snooping group entries.
- Although you can configure subsecond PIM query intervals on Catalyst 4500 platforms, such an action represents a compromise between convergence (reaction time) and a number of other factors (number of mroutes, base line of CPU utilization, CPU speed, processing overhead per 1 m-route, etc.). You must account for those factors when configuring subsecond PIM timers. We recommend

that you set the PIM query interval to a minimum of 2 seconds. By adjusting the available parameters, you can achieve flawless operation; that is, a top number of multicast routes per given convergence time on a specific setup.

- With Cisco IOS Release XE 3.2.1SG, **memory** configuration is enabled:

```
Switch(config)# memory ?
  chunk    chunk related configuration
  free     free memory low water mark
  record   configure memory event/traceback recording options
  reserve  reserve memory
  sanity   Enable memory sanity
```

  This configuration had been removed erroneously in a prior release.

- The Catalyst 4510R switch does not support Supervisor Engines 6L-E. Installing an unsupported supervisor engine causes unpredictable hardware behavior that cannot be controlled by the software. Using an unsupported supervisor engine in a redundant slot might cause a supported supervisor engine in the other slot to malfunction.
- The MAC address table is cleared while you switch between supervisor engines if either the 802.1s or 802.1w Spanning Tree Protocol is configured. To minimize address clearing and subsequent packet flooding, configure the edge ports as **spanning-tree portfast** and the link type as **spanning-tree link-type point-to-point**.
- IP classful routing is not supported; do not use the **no ip classless** command; it will have no effect, because only classless routing is supported. The command **ip classless** is not supported because classless routing is enabled by default.
- A Layer 2 LACP channel cannot be configured with the spanning tree PortFast feature.
- Netbooting using a boot loader image is not supported.
- When you deploy redundant supervisors in a Catalyst 4507R, for hardware that does not exist while the startup configuration file is being parsed, the configuration file for the hardware is not applied.

  For example, if the active supervisor engine is in slot 1, and you have configured interface Gi1/1, the supervisor engine in slot 2 becomes active if you remove the active supervisor engine from the chassis. In addition, while the startup configuration file is being parsed, you will receive an error message indicating that interface Gi1/1 is no longer present. This behavior is correct. When the formerly active supervisor engine is reinserted into slot 1, there is no configuration for interface Gi1/1.

  This situation will not occur when both supervisor engines are physically in the chassis.

  Workaround: Copy the startup configuration file into the running configuration:

```
Switch# copy startup-config running-config
```

- An unsupported default CLI for mobile IP is displayed in the HSRP configuration. Although this CLI will not harm your system, you might want to remove it to avoid confusion.

  Workaround: Display the configuration with the **show standby** command, then remove the CLI. Here is an example of **show standby GigabitEthernet1/1** command output:

```
switch(config)# interface g1/1
switch(config)# no standby 0 name (0 is hsrp group number)
```

- For HSRP preempt delay to function consistently, you must use the **standby delay minimum** command. Be sure to set the delay to more than 1 hello interval, thereby ensuring that a hello is received before HSRP leaves the initiate state.

  Use the **standby delay reload** option if the router is rebooting after reloading the image.

- When you attempt to run OSPF between a Cisco router and a third party router, the two interfaces might get stuck in the Exstart/Exchange state. This problem occurs when the maximum transmission unit (MTU) settings for neighboring router interfaces do not match. If the router with the higher MTU sends a packet larger than the MTU set on the neighboring router, the neighboring router ignores the packet.

  Workaround: Ensure that the MTUs match.

- You can run only .1q-in-.1q packet pass-through with Supervisor Engine 6-E.
- For PVST and Catalyst 4500 E-Series switch VLAN, Cisco IOS Release 12.1(13)EW support a maximum of 3000 spanning tree port instances. If you want to use more instances, use MST rather than PVST.
- Because the Supervisor Engine 6-E supports the FAT filesystem, the following restrictions apply:
  - The **verify** and **squeeze** commands are not supported.
  - The **rename** command is supported in FAT file system.

    For Supervisor Engine 6-E, the **rename** command is available for bootflash and slot0. For all other supervisor engines, the **rename** command is supported for nvram devices only.
  - The **fsck** command is supported for slot0 device. It is not supported in the file systems on supervisor engines other than 6-E.
  - In the FAT file system, the IOS **format bootflash:** command erases user files only. It does not erase system configuration.
  - The FAT file system supports a maximum of 63 characters for file/directory name. The maximum for path length is 127 characters.
  - The FAT file system does not support the following characters in file/directory names:{}#%^ and space characters.
  - The FAT file system honors the Microsoft Windows file attribute of read-only and read-write, but it does not support the Windows file hidden attribute.
  - Supervisor Engine 6-E uses the FAT file system for compact flash (slot0). If a compact flash is not formatted in FAT file system (such as compact flash on a supervisor engine other than 6-E), the switch does not recognize it.
- If an original packet is dropped because of transmit queue shaping or sharing configurations, a SPAN packet copy can still be transmitted on the SPAN port.
- All software releases support a maximum of 16,000 IGMP snooping group entries.
- To maximize performance, use the **no ip unreachables** command on all interfaces that are configured for ACLs.
- The threshold for the Dynamic Arp Inspection err-disable function is set to 15 ARP packets per second per interface. You should adjust this threshold depending on the network configuration. The CPU should not receive DHCP packets at a sustained rate greater than 1000 pps.
- If you first configure an IP address or IPv6 address on a Layer 3 port, then change the Layer 3 port to a Layer 2 port with the **switchport** command, and finally change it back to a Layer 3 port, the original IP/IPv6 address is lost.
- In a redundant system, do not remove and reinsert the standby supervisor engine while the active supervisor engine is booting. Doing so may cause the online diagnostics test to fail.

  Workaround: Remove and reinsert the standby supervisor engine after the active supervisor engine boots. (CSCsa66509)

- The **switchport private-vlan mapping trunk** command supports a maximum of 500 unique private VLAN pairs. For example, 500 secondary VLANs could map to one primary VLAN, or 500 secondary VLANs could map to 500 primary VLANs.
- Support for PoE depends on the use of the following line cards and power supplies.

  PoE switching modules:

  - WS-X4148-RJ45V
  - WS-X4224-RJ45V
  - WS-X4248-RJ45V
  - WS-X4248-RJ21V
  - WS-X4524-GB-RJ45V
  - WS-X4548-GB-RJ45V
  - WS-X4648-RJ45V-E
  - WS-X4648-RJ45V+E
  - WS-X4548-GB-RJ45V+

  PoE enabled power supplies:

  - PWR-C45-1300ACV
  - PWR-C45-1400DC
  - PWR-C4K-2800AC
  - PWR-C45-1400AC
  - PWR-C45-1300ACV
  - PWR-C45-6000ACV
- If a Catalyst 4500 series switch requests information from the Cisco Secure Access Control Server (ACS) and the message exchange times out because the server does not respond, a message similar to this appears:

  ```
  00:02:57: %RADIUS-4-RADIUS_DEAD: RADIUS server 172.20.246.206:1645,1646 is not
  responding.
  ```

  If this message appears, ensure network connectivity exists between the switch and the ACS. Also check that the switch has been properly configured as an AAA client on the ACS.
- For IP Port Security (IPSG) for static hosts, the following apply:
  - As IPSG learns the static hosts on each interface, the switch CPU may achieve 100 percent if there are a large number of hosts to learn. The CPU usage will drop after the hosts are learned.
  - IPSG violations for static hosts are printed as they occur. If multiple violations occur simultaneously on different interfaces, the CLI displays the last violation. For example, if IPSG is configured for 10 ports and violations exist on ports 3,6, and 9, the violation messages are printed only for port 9.
  - Inactive host bindings will appear in the device tracking table when either a VLAN is associated with another port or a port is removed from a VLAN. So, as hosts are moved across subnets, the hosts appear in the device tracking table as inactive.
  - Autostate SVI does not work on EtherChannel.
- When IPv6 is enabled on an interface with any CLI, you might see the following message:

  ```
  % Hardware MTU table exhausted
  ```

In such a scenario, the IPv6 MTU value programmed in hardware differs from the IPv6 interface MTU value. This occurs if no room exists in the hardware MTU table to store additional values.

To create room, unconfigure some unused MTU values. Then, either disable or re-enable IPv6 on the interface, or reapply the MTU configuration.

- To stop IPSG with static hosts on an interface, use the following commands in interface configuration submode:

```
Switch(config-if)# no ip verify source
Switch(config-if)# no ip device tracking max
```

To enable IPSG with static hosts on a port, enter the following commands:

```
Switch(config)# ip device tracking ****enable IP device tracking globally
Switch(config)# ip device tracking max <n> ***set an IP device tracking maximum on int
Switch(config-if)# ip verify source tracking [port-security] ****activate IPSG on port
```

Caution If you configure the **ip verify source tracking [port-security]** interface configuration command on a port without enabling IP device tracking globally or setting an IP device tracking maximum on that interface, IPSG with static hosts reject all the IP traffic from that interface.

Note The preceding condition also applies to IPSG with static hosts on a PVLAN host port.

- uRPF supports up to four paths. If a packet arrives at one of the valid VLANs that is not programmed as one of the RPF VLAN in hardware, it is dropped. If traffic may arrive from any other interfaces without RPF configured, it can be switched.
- Input and output ACLs cannot override or filter traffic received on an uRPF interface.
- No CLI command exists to reflect uRPF drop packets during hardware switching. The **sh ip traffic** and **show cef int** commands do not reflect uRPF drops.
- IPv6 ACL is not supported on a switchport. IPv6 packets cannot be filtered on switchports using any of the known methods: PACL, VACL, or MACLs.
- Class-map match statements using **match ip prec | dscp** match only IPv4 packets, whereas matches performed with **match prec | dscp** match both IPv4 and IPv6 packets.
- IPv6 QoS hardware switching is disabled if the policy-map contains IPv6 ACL and match CoS in the same class-map with the IPv6 access-list has any mask within the range /81 and /127. This situation causes forwarding packets to software, which efficiently disables the QoS.
- When the following data-only Catalyst 4500 linecards are used in a Catalyst 4507R-E or 4510R-E chassis with Supervisor Engine 6-Es, the capacity of the power supply may be exceeded:
  - WS-X4148-FX-MT Cisco Catalyst 4500 Fast Ethernet Switching Module, 48-port 100BASE-FX (MT-RJ)
  - WS-X4448-GB-RJ45 Cisco Catalyst 4500 48-port 10/100/1000 Module (RJ-45)

  The Catalyst 4503-E and Catalyst 4506-E have no caveats. The Catalyst 4507R-E configurations that use power supplies rated at 1400 W or above also have no caveats.

  The following replacement switching modules will not exceed the power supply capacity for any Catalyst 4500-E chassis:

	Recommended Replacement	Description
WS-X4148-FX-MT	WS-X4248-FE-SFP	Fast Ethernet, 48-port 100BASE-X (SFP)
WS-X4448-GB-RJ45	WS-X4548-GB-RJ45	Enhanced 48-port 10/100/1000 Module (RJ-45)
WS-X4448-GB-RJ45	WS-X4648-RJ45V-E	E-Series 48-port 802.3af PoE 10/100/1000 (RJ-45)

Refer to the *Catalyst 4500 Series Module Installation Guide* to determine the power requirements for all of the Catalyst 4500 linecards and the power capacities of the Catalyst 4500 power supplies.

- Supervisor Engine 6-E *only* supports Catalyst 4500 Series linecards in slots 8-10.
- If you remove a line card from a redundant switch and initiate an SSO switch-over, then reinsert the line card, all interfaces are shutdown. The remaining configuration on the original line card is preserved.

  This situation only occurs if a switch reached SSO before you removed the line card.
- On Supervisor Engine 6-E, upstream ports support flow control auto negotiation in 1G mode only, and flow control is forced in 10G mode. If the interface is configured to auto-negotiate the flow control, and the interface is operating in 10G mode, the system forces flow control to ON and does not auto-negotiate.
- Supervisor Engine 6-E supports fast UDLD on a maximum of 32 ports.
- With Cisco IOS Release 12.2(53)SG3 (and 12.2(54)SG), we changed the default behavior such that your single supervisor, RPR, or fixed configuration switch does not reload automatically. To configure automatic reload, you must enter the **diagnostic fpga soft-error recover aggressive** command. (CSCth16953)
- Energywise WOL is not “waking up” a PC in hibernate or standby mode.

  Workaround: None. CSCtr51014
- The ROMMON version number column in the output of **show module** command is truncated.

  Workaround: Use the **show version** command. CSCtr30294
- IP SLA session creation fails randomly for various 4-tuples.

  Workaround: Select an alternate destination or source port. CSCty05405
- The system cannot scale to greater than 512 SIP flows with MSP and metadata enabled.

  Workaround: None. CSCty79236
- On the following linecards running IOS Release 15.0(2)SG3:
  - 48 10/100/1000BaseT Premium POE E Series WS-X4648-RJ45V+E (JAE14310RHU)
  - 6 Sup 6-E 10GE (X2), 1000BaseX (SFP) WS-X45-SUP6-E (JAE13104VVY)

  the following restrictions apply:
  - Sub-interfaces are not supported on 1 Gigabit and Ten-Gigabit interfaces.
  - Port-channel members do not support multiple classification criteria for a QoS policy.
  - CEF is disabled automatically when uRFP is enabled and TCAM is fully utilized.

- When you enter the **ip http secure-server** command (or if the system reads it from the startup configuration), the device searches for a persistent self-signed certificate during boot up.
  - If such a certificate does not exist and the device's hostname and default_domain are set, then a persistent self-signed certificate is generated.
  - If such a certificate exists, the FQDN in the certificate is compared with the current device's hostname and default_domain. If either differs from the FQDN in the certificate, the existing persistent self-signed certificate is replaced with a new one with the updated FQDN. Be aware that the existing key pair is used in the new certificate.

  On a switch that supports redundancy, the generation of the self-signed certificate occurs independently on the active and the standby supervisor engines, and the certificates differ. After switchover, the HTTP client that holds the old certificate cannot connect to the HTTPS server.

  Workaround: Reconnect. CSCsb11964
- When policing IEEE 802.1Q tagged non-IP traffic and calculating traffic conformance, the policer excludes the four bytes that constitute the 802.1Q tag even when you enter the **qos account layer2 encapsulation** command.

  Workaround: None. CSCsg58526
- When hard-coded duplex and speed settings are deleted after an interface shuts down, an **a-** is added to the duplex and speed in the output from the **show interface status** command.

  This does not affect performance.

  Workaround: Enter the **no shutdown** command. CSCsg27395
- When a transceiver is removed rapidly from one port and placed in another on the same chassis, occasionally a duplicate seeprom message appears and the port is not able to handle traffic.

  Workaround: Remove the transceiver from the new port and place it in the old port. After the SFP is recognized in the old port, remove it slowly and insert it in the new port. (CSCse34693)
- When performing an ISSU upgrade and the versions of the active and standby supervisor engines differ, you see the following message in the standby supervisor engine console:

  ```
  %XDR-6-XDRINVALIDHDR: XDR for client (CEF push) dropped (slots:2 from slot:3
  context:145 length:11) due to: invalid context
  ```

  Workaround: None. This is an informational message. CSCsi60898
- An IP unnumbered configuration is lost after a switch reloads.

  Workarounds: Do one of the following:
  - After a reload, copy the startup-config to the running-config.
  - Use a loopback interface as the target of the **ip unnumbered** command.
  - Change the CLI configuration so that during bootup the router port is created first.

  CSCsq63051
- In SSO mode, when a port channel is created, deleted, and recreated on an active supervisor engine with the same channel number, the standby port channel state goes out of sync. After a switch over, the following message displays:

  ```
  %PM-4-PORT_INCONSISTENT: STANDBY:Port is inconsistent:
  ```

  Workaround: When the port channel starts to flap, enter **shut** and **no shut** on the port channel. After the first switchover and after deleting the port channel, create a new channel. CSCsr00333

- When you remove a line card containing ports configured with IGMP snooping while booting a standby supervisor engine, the active supervisor engine does not synchronize this configuration to the standby supervisor engine as a part of a bulk synchronization. When you reinstall the line card, the configuration in the active and standby supervisor engines will differ.

  Workaround: Do one of the following:

  - Reload the standby switch again with the line card in place.
  - Remove and reenter the commands on the active supervisor engine. The standby supervisor engine will acquire this change. CSCsv44866

- After posture validation succeeds, the following benign traceback messages may appear after you unconfigure the **global RADIUS** and **IP device tracking** commands:

```
%SM-4-BADEVENT: Event 'eouAAAAuthor' is invalid for the current state 'eou_abort':
eou_auth 4.1.0.101   Traceback= 101D9A88 10B76BB0 10B76FE0 10B7A114 10B7A340 1066A678
106617F8
%SM-4-BADEVENT: Event 'eouAAAAuthor' is invalid for the current state 'eou_abort':
eou_auth 4.1.0.102   Traceback= 101D9A88 10B76BB0 10B76FE0 10B7A114 10B7A340 1066A678
106617F8
```

  This applies to classic or E-series Catalyst 4500 supervisor engines running Cisco IOS Release 12.2(50)SG

  Workaround: None. CSCsw14005

- The host's MAC address is not synchronized to the standby supervisor engine after you unconfigure 802.1X on the port and reconnect the host to a IP phone (with CDP port status TLV support) that is connected to the switch.

  If the switch were to run a supervisor switchover while in this state, the host's MAC address would not be present in the new active supervisor engine's MAC address table, causing possible connectivity interruption on the host.

  Workaround: Enter the **shutdown** command, followed by the **no shutdown** command on the interface. This triggers relearning and synchronizing of the host's MAC to the standby supervisor engine. CSCsw91661

- On a wireless control system (WCS), some device information is incorrectly displayed for PCs sitting behind an lldp-med capable phone. Specifically, WCS displays the phone's serial number, model number, and software version in the PC's device information. All other information about the PC is correctly displayed on WCS.

  This only happens when the switch is running network mobility service protocol (nmsp). It does not happen if the phone is CDP enabled.

  Workaround: Use the VLAN ID or name to differentiate the IP phone and the PC sitting behind the phone on the WCS.

  The IP phone is detected on the voice VLAN, and the displayed information of serial number, model number, and software version is correct. However, a PC sitting behind the phone is detected on a data VLAN, and the displayed device information is wrong and should be ignored.

  CSCsz34522

- If *time* is not specified in the **link debounce** command, the default value depends on the supervisor engine. The default is 10 mS for a Catalyst 4900M switch, Supervisor Engine 6-E, and Supervisor Engine 6L-E. The default is 100 mS for all other supervisor engines.

Despite the different default value, you can configure any value in the time range.

Workaround: None. CSCte51948

- On a peer interface on a Catalyst 4948E Ethernet Switch, if errdisabled mode flap detection is set to a very small number (such as 2 flaps in 10 sec), a 10GE link flap may cause the peer interface to enter the errdisabled state.

  Workarounds: The Cisco switch default link-flap detection value is 5 flaps in 10 seconds. Use the default value or larger numbers. CSCtg07677

- After you have enabled EPM logging and the client is authenticated via MAB or Webauth, the value of AUTHTYPE is DOT1X in EPM syslog messages irrespective of the authentication method.

  Similarly, the **show epm sessions** command always displays the authentication method as DOT1X.

  Workaround: To view the authentication method used for a client, enter the **show authentication sessions** command. CSCsx42157

- With CFM enabled globally as well as on an ingress interface, CFM packets received on the interface are not policed with hardware control plane policing.

  Workaround: None. CSCso93282

- When either the RADIUS-server test feature is enabled or RADIUS-server dead-criteria is configured, and either RADIUS-server deadtime is set to 0 or not configured, the RADIUS-server status is not properly relayed to AAA.

  Workaround: Configure both dead-criteria and deadtime.

  ```
  radius-server dead-criteria
  radius-server deadtime
  ```

  CSCtl06706

- Occasionally, if you use an X2 SR transceiver on a WS-X4706-10GE running Cisco IOS Release 12.2(40)SG, you observe CRC errors after a reload or power cycle upon inserting the card or X2.

  Workaround: Reinsert the X2. CSCsk43618

- Uplinks go down when you upgrade the ROMMON of an WS-X45-SUP6-E supervisor from version 12.2(40r)SG1 to a later version.

  This behavior occurs in a redundant switch when the active supervisor engine is running Cisco IOS, the standby supervisor engine is in ROMMON, and the standby supervisor engine's ROMMON is upgraded from version 0.34 or to a later version. The upgrade process causes the uplinks on the standby supervisor engine to go down but the active supervisor engine is unaware of this.

  Workarounds: To resume normal operation, do one of the following:

  – Reload both supervisor engines with the **redundancy reload shelf** command.

  – Power-cycle the standby supervisor engine by briefly pulling it from the chassis.

  There is *no* workaround for the link flap issue. CSCsm81875

- Changing the flow control configuration with traffic and pause frames causes some traffic loss.

  This problem can happen when pause frames are sent to a switch port and the flow control receive configuration is toggled on a 10-Gigabit Ethernet port.

  Workaround: Change the flow control receive configuration when no traffic exists. CSCso71647

- When you configure **vlan dot1q tag native** globally on Supervisor Engine 6-E, MST control packets are tagged on egress on the native VLAN. This conflicts with 802.1s. The Cisco 7600 Series router drops its MST proposal agreements (because it expects the native VLAN MST control packets to be untagged), causing 30 seconds of traffic loss while spanning tree converges.

  Workaround: Disable native VLAN tagging on the trunk port of the switch by entering the **no switchport trunk native vlan tag** command. CSCsz12611

- If a large number of VLAN mappings are configured, a member port might fail to join a port channel and no warning is issued.

  Workaround: Reduce the number of VLAN mappings. CSCtn56208

- If an interface whose IP address is being used as the router ID is deleted or shuts down, and you configure a service group with a multicast group address, packet redirection to CE stops and packets are forwarded directly to the destination.

  Workaround: Unconfigure and reconfigure the service group. CSCtn88087

- Global WCCP service configuration fails to enable (WCCP global configuration is accepted but nvgen fails) on a newly deployed switch if the switch is not enabled for SVI or a Layer 3 interface.

  Workaround: Enable a Layer 3 interface in the running configuration. CSCsc88636.

- If you use the **quick** option in the **issu changeversion** command, the following might occur:
  - Links flap for various Layer 3 protocols.
  - A traffic loss of several seconds is observed during the upgrade process.

  Workaround: Do not use the **quick** option with the **issu changeversion** command. CSCto51562

- When you enter the **ip pim register-rate-limit** command, the following error message displays:

  ```
  'Failed to configure service policy on register tunnel' and 'STANDBY:Failed to
  configure service policy on register tunnel'.
  ```

  Workaround: None. The **ip pim register-rate-limit** command does not function. CSCub32679

- For packets with the same ingress and egress Layer 3 interface, ingress QoS marking policy does not work.

  Workaround: Turn off ICMP redirect through the **ip redirect** command. CSCua71929

- While configuring an IPv6 access-list, if you specify **hardware statistics** as the first statement in v6 access-list mode (i.e. before issuing any other v6 ACE statement), it will not take effect. Similarly, your hardware statistics configuration will be missing from the output of the **show running** command.

  You will not experience this behavior with IPv4 access lists.

  Workaround: During IPv6 access-list configuration, configure at least one IPv6 ACE before the "hardware statistics" statement. CSCuc53234

- When an IPv6 FHS policy is applied on a VLAN and an EtherChannel port is part of that VLAN, packets received by EtherChannel (from neighbors) are not bridged across the local switch.

  Workaround: Apply FHS policies on a non EtherChannel port rather than a VLAN. CSCua53148

- Memory allocation failures can occur if more than 16K IPv6 multicast snooping entries are present.

  Workaround: None. CSCuc77376

- For any configuration where the source-interface keyword is used, if you provide an SVI that is associated with a secondary private VLAN, configuration involving the secondary VLAN may be lost when the switch is reloaded. In such scenarios, always use the primary private VLAN.

- The **show interface capabilities** command output does not show the correct linecard model.

  Workaround: Observe the **show module** command output. CSCua79513

- When performing an ISSU between any releases prior to Cisco IOS 15.1(1)SG or 3.3.0SG to release Cisco IOS 15.1(1)SG (or 3.3.0SG) or higher, a switch performing multicast routing may persistently drop traffic after the upgrade completes. You can recover multicast traffic by reloading the chassis. Alternately, you can remove all multicast configuration prior to ISSU, and add it back when ISSU completes. CSCuj42672

Caveats

Caveats describe unexpected behavior in Cisco IOS releases. Caveats listed as open in a prior release are carried forward to the next release as either open or resolved.

Note All caveats in Release 12.4 also apply to the corresponding 12.1 E releases. Refer to the *Caveats for Cisco IOS Release 12.4* publication at the following URL:

http://www.cisco.com/en/US/docs/ios/12_4/release/notes/124MCAVS.html

Note For the latest information on PSIRTS, refer to the Security Advisories on CCO at the following URL:

http://tools.cisco.com/security/center/publicationListing

Open Caveats for Cisco IOS Release 15.2(1)E3

- VTP databases do not propagate through promiscuous trunk ports. If only promiscuous trunks are configured, you will not see the VLAN updates on the other switches in the VTP domain.

  Workaround: Configure an ISL/dot1q trunk port. CSCsu43445

- When you run Cisco IOS Release 12.2(53)SG1, 12.2(50)SG6, or later releases and configure switchport block multicast on a switch, Layer 2 multicast is not blocked. IPv4 and IPV6 unknown multicast traffic is blocked.

  Prior to Cisco IOS Release 12.2(53)SG1 and 12.2(50)SG6, the switchport block multicast command blocks IP Multicast, Layer 2 multicast, and broadcast traffic. CSCta61825

  Workaround: None CSCtb30327

- When you configure open authentication and perform SSO, the spanning tree state and MAC address are not synchronized to the new standby supervisor engine. This behavior interrupts traffic only after the second switchover because the new standby supervisor engine possesses the wrong state after the initial switchover and the second switchover starts the port in the blocking state.

  Workaround: Enter **shut** and **no shut** on the port to synchronize the STP state. CSCtf52437

- A device in a Guest VLAN that is connected behind a phone capable of 2nd-port-TLV, experiences packet loss following a SSO failover. The device experiences an authentication restart after the first CDP frame arrives from the phone.

  Workaround: None. CSCto46018

- When you have two Layer 3 CE-facing interfaces, each connected to a CE to split WCCP between the CEs, and you move a WCCP service (such as 60 (ftp-native)) from one interface to the other, the target interface fails to completely transfer the service from the old to the new CE.

  Workaround: Shut down the CE-facing interface. After all of the mask-value entries point to the target CE, unshut the CE-facing interface. CSCtl09941

- If *burst* is not explicitly configured for a single rate policer, the **show policy-map** command displays an incorrect burst value.

  Workaround: Enter the **show policy-map interface** command to find the actual *burst* value programmed. CSCsi71036

- When you enter the **show policy-map vlan** *vlan* command, unconditional marking actions that are configured on the VLAN are not shown.

  Workaround: None.

  If you enter the **show policy-map** *name*, however, the unconditional marking actions appear. CSCsi94144

- If an EtherChannel is a member of a FlexLink pair, then static MAC addresses configured on the EtherChannel are not moved to the alternate port when the EtherChannel fails (FlexLink failure).

  Workaround: None. CSCsq99468

- When a CFM Inward Facing MEP (IFM) is configured on a VLAN that is not allocated on a switch port that is DOWN, the **show ethernet cfm maintenance-points local** command displays the IFM CC Status as inactive. When you allocate the VLAN, the CC-status remains inactive.

  You only see this behavior if you initially did not allocate a VLAN before you configure the IFM, and then later allocate the same VLAN.

  Workaround: Unconfigure, and then reconfigure the IFM on the port.

- Before large PACLs are fully loaded in hardware, you might observe a false completion messages like the following:

  ```
  Dec  1 18:44:59.926: %C4K_COMMONHWACLMAN-4-HWPROGSUCCESS: Input Security: pacl - now
  fully loaded in hardware *Dec  1 18:44:59.926: %C4K_COMMONHWACLMAN-4-ALLACLINHW: All
  configured ACLs now fully loaded in hardware - hardware switching / QoS restored.
  ```

  Workaround: No functional impact.

  You must wait for the ACLs to be programmed before performing other TCAM related changes. CSCtd57063

- WCCP service is not reacquired when a service group with a multicast group address is unconfigured, and then reconfigured.

  Workaround: Configure IP multicast routing globally and establish IP PIM sparse dense mode on the CE-facing interface. CSCtl97692

- When you enable both Cisco TrustSec and RADIUS accounting, a disparity occurs between the RADIUS client (Cisco switch) and the RADIUS/CTS server in how the authenticator field in the header is computed for DOT1X/RADIUS accounting messages.

  A Cisco IOS AAA client uses the PAC secret to compute the authenticator; Cisco Secure ACS 5.2 uses the shared secret. This behavior causes a mismatch that results in a rejection of the accounting message, and the client marks the server as unresponsive.

  Workaround: None. You must disable 802.1X accounting. CSCts26844

- When more than one Equal Cost Multipath (ECMP) is available on the downstream switch, and Mediatrace is invoked to provide flow statistics, the dynamic policy does not show statistics for a flow.

  Mediatrace cannot find the correct inbound interface and applies the dynamic policy on a different interface from the one used for media flow.

  Workaround: None. CSCts20229

- Configuring an interface as unidirectional with the **unidirectional send-only | receive-only** command still allows the interface to send (configured as Send-only Unidirection Ethernet mode) or receive (configured as Receive-only Unidirection Ethernet mode) packets in a bidirectional mode.

  Workaround: None. CSCtx95359

- When you add a "bfd" suffix to the **snmp server host** *x.x.x.x* configuration command, the BFD traps, ciscoBfdSessUp and ciscoBfdSessDown, are not generated.

  Workaround: Do not specify a "bfd" suffix with the **snmp-server host** *x.x.x.x* configuration command. CSCtx51561

- When you transfer a startup-config to the switch directly without entering **write mem**, and the startup-config contains the **hw-module uplink shared-backplane** command, the four ports on a Supervisor Engine 6-E are not activated in subsequent reloads. The second port of each supervisor engine remains inactive.

  Workaround: Configure **hw-module uplink shared-backplane** from the console or vty, and enter **write mem**. CSCtx43568

- With IGMP snooping enabled, multicast traffic received through a tunnel interface is not forwarded out the Outgoing Interface List.

  Workaround: Disable IGMP snooping. CSCuc65538

- On systems performing multicast routing, a brief increase in CPU consumption occurs every few minutes. In large-scale environments, this CPU increase is more noticeable.

  Workaround: None. CSCub44553

- When MLD snooping is enabled, control-plane policing on IPv6 ND packets stops working. This does not impact other control packets.

  Workaround: None. CSCua89658

- When a port connected to a CDP speaker goes down, a small memory leak occurs (typically less than 300 bytes).

  Workaround: Disable CDP on interfaces that may flap frequently. CSCub85948

- If no vlan.dat exists on both source and destination, the **sync** command fails (i.e., the synchronization between flash to sdflash or sdflash to flash doesn't happen).

  Workarounds:

  - Skip the vlan.dat check.
  - Rename any config.text files as vlan.dat file. CSCue61001

- An IPv6 BFD session flaps if you configure a 100 * 3 timer value.

  Workaround: Set the BFD timer and multiplier as 100 * 5. CSCuh35017

- BFD supports 300ms and time values exceeding (100 * 3).

  Workaround: None. CSCuh19345

- A switch crashes when the you enter the **show power inline module 1** and **show power inline module 1 detail** commands in two different telnet sessions and reset the linecard using a third telnet session.

  Workaround: Reset the term length to 0 on the vty session. CSCuf08112

- If you configure SNMP proxy and immediately remove it, your switch crashes.

  Workaround: Wait two min before removing the proxy. CSCug69823

- IPv6 Source Guard does not block packets from IP sources that are not in the binding table.

  Workaround: None CSCug79180

- When the standby of a VSS system reloads and the CTS links are in **no shutdown** state, the CTS links on the standby are stuck in AUTHEN state..

  Workaround: Enter the **shutdown** command followed by the **no shutdown** command. CSCuv15017

Resolved Caveats in Cisco IOS Release 15.2(1)E3

- None

Open Caveats for Cisco IOS Release 15.2(1)E2

- VTP databases do not propagate through promiscuous trunk ports. If only promiscuous trunks are configured, you will not see the VLAN updates on the other switches in the VTP domain.

  Workaround: Configure an ISL/dot1q trunk port. CSCsu43445

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  - Skip the vlan.dat check.
  - Rename any config.text files as vlan.dat file. CSCue61001

- An IPv6 BFD session flaps if you configure a 100 * 3 timer value.

  Workaround: Set the BFD timer and multiplier as 100 * 5. CSCuh35017

- BFD supports 300ms and time values exceeding (100 * 3).

  Workaround: None. CSCuh19345

- A switch crashes when the you enter the **show power inline module 1** and **show power inline module 1 detail** commands in two different telnet sessions and reset the linecard using a third telnet session.

  Workaround: Reset the term length to 0 on the vty session. CSCuf08112

- If you configure SNMP proxy and immediately remove it, your switch crashes.

  Workaround: Wait two min before removing the proxy. CSCug69823

- IPv6 Source Guard does not block packets from IP sources that are not in the binding table.

Workaround: None CSCug79180

Resolved Caveats in Cisco IOS Release 15.2(1)E2

- mDNS malformed packets cause the switch to crash during normal network operation.

  Workaround: None. CSCul90866

Open Caveats for Cisco IOS Release 15.2(1)E1

- VTP databases do not propagate through promiscuous trunk ports. If only promiscuous trunks are configured, you will not see the VLAN updates on the other switches in the VTP domain.

  Workaround: Configure an ISL/dot1q trunk port. CSCsu43445

- When you run Cisco IOS Release 12.2(53)SG1, 12.2(50)SG6, or later releases and configure switchport block multicast on a switch, Layer 2 multicast is not blocked. IPv4 and IPV6 unknown multicast traffic is blocked.

  Prior to Cisco IOS Release 12.2(53)SG1 and 12.2(50)SG6, the switchport block multicast command blocks IP Multicast, Layer 2 multicast, and broadcast traffic. CSCta61825

  Workaround: None CSCtb30327

- When you configure open authentication and perform SSO, the spanning tree state and MAC address are not synchronized to the new standby supervisor engine. This behavior interrupts traffic only after the second switchover because the new standby supervisor engine possesses the wrong state after the initial switchover and the second switchover starts the port in the blocking state.

  Workaround: Enter **shut** and **no shut** on the port to synchronize the STP state. CSCtf52437

- A device in a Guest VLAN that is connected behind a phone capable of 2nd-port-TLV, experiences packet loss following a SSO failover. The device experiences an authentication restart after the first CDP frame arrives from the phone.

  Workaround: None. CSCto46018

- When you have two Layer 3 CE-facing interfaces, each connected to a CE to split WCCP between the CEs, and you move a WCCP service (such as 60 (ftp-native)) from one interface to the other, the target interface fails to completely transfer the service from the old to the new CE.

  Workaround: Shut down the CE-facing interface. After all of the mask-value entries point to the target CE, unshut the CE-facing interface. CSCtl09941

- If *burst* is not explicitly configured for a single rate policer, the **show policy-map** command displays an incorrect burst value.

  Workaround: Enter the **show policy-map interface** command to find the actual *burst* value programmed. CSCsi71036

- When you enter the **show policy-map vlan** *vlan* command, unconditional marking actions that are configured on the VLAN are not shown.

  Workaround: None.

  If you enter the **show policy-map** *name*, however, the unconditional marking actions appear. CSCsi94144

- If an EtherChannel is a member of a FlexLink pair, then static MAC addresses configured on the EtherChannel are not moved to the alternate port when the EtherChannel fails (FlexLink failure).

Workaround: None. CSCsq99468

- When a CFM Inward Facing MEP (IFM) is configured on a VLAN that is not allocated on a switch port that is DOWN, the **show ethernet cfm maintenance-points local** command displays the IFM CC Status as inactive. When you allocate the VLAN, the CC-status remains inactive.

  You only see this behavior if you initially did not allocate a VLAN before you configure the IFM, and then later allocate the same VLAN.

  Workaround: Unconfigure, and then reconfigure the IFM on the port.

- Before large PACLs are fully loaded in hardware, you might observe a false completion messages like the following:

  ```
  Dec  1 18:44:59.926: %C4K_COMMONHWACLMAN-4-HWPROGSUCCESS: Input Security: pacl - now
  fully loaded in hardware *Dec  1 18:44:59.926: %C4K_COMMONHWACLMAN-4-ALLACLINHW: All
  configured ACLs now fully loaded in hardware - hardware switching / QoS restored.
  ```

  Workaround: No functional impact.

  You must wait for the ACLs to be programmed before performing other TCAM related changes. CSCtd57063

- WCCP service is not reacquired when a service group with a multicast group address is unconfigured, and then reconfigured.

  Workaround: Configure IP multicast routing globally and establish IP PIM sparse dense mode on the CE-facing interface. CSCtl97692

- When you enable both Cisco TrustSec and RADIUS accounting, a disparity occurs between the RADIUS client (Cisco switch) and the RADIUS/CTS server in how the authenticator field in the header is computed for DOT1X/RADIUS accounting messages.

  A Cisco IOS AAA client uses the PAC secret to compute the authenticator; Cisco Secure ACS 5.2 uses the shared secret. This behavior causes a mismatch that results in a rejection of the accounting message, and the client marks the server as unresponsive.

  Workaround: None. You must disable 802.1X accounting. CSCts26844

- When more than one Equal Cost Multipath (ECMP) is available on the downstream switch, and Mediatrace is invoked to provide flow statistics, the dynamic policy does not show statistics for a flow.

  Mediatrace cannot find the correct inbound interface and applies the dynamic policy on a different interface from the one used for media flow.

  Workaround: None. CSCts20229

- Configuring an interface as unidirectional with the **unidirectional send-only | receive-only** command still allows the interface to send (configured as Send-only Unidirection Ethernet mode) or receive (configured as Receive-only Unidirection Ethernet mode) packets in a bidirectional mode.

  Workaround: None. CSCtx95359

- When you add a "bfd" suffix to the **snmp server host** *x.x.x.x* configuration command, the BFD traps, ciscoBfdSessUp and ciscoBfdSessDown, are not generated.

  Workaround: Do not specify a "bfd" suffix with the **snmp-server host** *x.x.x.x* configuration command. CSCtx51561

- When you transfer a startup-config to the switch directly without entering **write mem**, and the startup-config contains the **hw-module uplink shared-backplane** command, the four ports on a Supervisor Engine 6-E are not activated in subsequent reloads. The second port of each supervisor engine remains inactive.

Workaround: Configure **hw-module uplink shared-backplane** from the console or vty, and enter **write mem**. CSCtx43568

- With IGMP snooping enabled, multicast traffic received through a tunnel interface is not forwarded out the Outgoing Interface List.

  Workaround: Disable IGMP snooping. CSCuc65538

- On systems performing multicast routing, a brief increase in CPU consumption occurs every few minutes. In large-scale environments, this CPU increase is more noticeable.

  Workaround: None. CSCub44553

- When MLD snooping is enabled, control-plane policing on IPv6 ND packets stops working. This does not impact other control packets.

  Workaround: None. CSCua89658

- When a port connected to a CDP speaker goes down, a small memory leak occurs (typically less than 300 bytes).

  Workaround: Disable CDP on interfaces that may flap frequently. CSCub85948

- If no vlan.dat exists on both source and destination, the **sync** command fails (i.e., the synchronization between flash to sdflash or sdflash to flash doesn't happen).

  Workarounds:

  - Skip the vlan.dat check.
  - Rename any config.text files as vlan.dat file. CSCue61001

- An IPv6 BFD session flaps if you configure a 100 * 3 timer value.

  Workaround: Set the BFD timer and multiplier as 100 * 5. CSCuh35017

- BFD supports 300ms and time values exceeding (100 * 3).

  Workaround: None. CSCuh19345

- A switch crashes when the you enter the **show power inline module 1** and **show power inline module 1 detail** commands in two different telnet sessions and reset the linecard using a third telnet session.

  Workaround: Reset the term length to 0 on the vty session. CSCuf08112

- If you configure SNMP proxy and immediately remove it, your switch crashes.

  Workaround: Wait two min before removing the proxy. CSCug69823

- IPv6 Source Guard does not block packets from IP sources that are not in the binding table.

  Workaround: None CSCug79180

Resolved Caveats in Cisco IOS Release 15.2(1)E1

- If **login quiet-mode** is configured, a switch resets when you enter the **no login block-for** command.

  Workaround: None.

  CSCts80209

- Provided an HTTP server is enabled on a switch, a vulnerability exists in Cisco IOS switches where the remote, non-authenticated attacker can cause Denial of Service (DoS) by reloading an affected device.

  An attacker can exploit this vulnerability by sending a special combination of crafted packets.

Workaround: None

PSIRT Evaluation:

The Cisco PSIRT has assigned this bug the following CVSS version 2 score. The Base and Temporal CVSS scores as of the time of evaluation are 5.4/4.2:

http://intellishield.cisco.com/security/alertmanager/cvssCalculator.do?

dispatch=1&version=2&vector=AV:N/AC:H/Au:N/C:N/I:N/A:C/E:POC/RL:OF/RC:C

CVE ID CVE-2013-1100 has been assigned to document this issue.

Additional details about the vulnerability described here can be found at:

http://tools.cisco.com/security/center/content/CiscoSecurityNotice/CVE-2013-1100

Additional information on Cisco's security vulnerability policy can be found at the following URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

CSCuc53853

- When you enable either the device-sensor accounting or the access-session accounting attributes command, the accounting request itself is not sent from the switch to the radius (ISE) Server.

  Workaround: Do not enable device-sensor accounting.

  The user accounting message will not carry the device-sensor attributes to the ISE.

  CSCuj56845

- A Dynamic ACL with a remark statement is not pushed from ISE to client and authorization either fails or is unauthorized.

  Workaround: Remove the remark statement from the DACL. CSCuj35704

Open Caveats for Cisco IOS Release 15.2(1)E

- VTP databases do not propagate through promiscuous trunk ports. If only promiscuous trunks are configured, you will not see the VLAN updates on the other switches in the VTP domain.

  Workaround: Configure an ISL/dot1q trunk port. CSCsu43445

- When you run Cisco IOS Release 12.2(53)SG1, 12.2(50)SG6, or later releases and configure switchport block multicast on a switch, Layer 2 multicast is not blocked. IPv4 and IPV6 unknown multicast traffic is blocked.

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  Workaround: None CSCtb30327

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  Workaround: Enter **shut** and **no shut** on the port to synchronize the STP state. CSCtf52437

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  Dec  1 18:44:59.926: %C4K_COMMONHWACLMAN-4-HWPROGSUCCESS: Input Security: pacl - now
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  configured ACLs now fully loaded in hardware - hardware switching / QoS restored.
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  Workaround: No functional impact.

  You must wait for the ACLs to be programmed before performing other TCAM related changes. CSCtd57063

- WCCP service is not reacquired when a service group with a multicast group address is unconfigured, and then reconfigured.

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  Mediatrace cannot find the correct inbound interface and applies the dynamic policy on a different interface from the one used for media flow.

  Workaround: None. CSCts20229

- Configuring an interface as unidirectional with the **unidirectional send-only | receive-only** command still allows the interface to send (configured as Send-only Unidirection Ethernet mode) or receive (configured as Receive-only Unidirection Ethernet mode) packets in a bidirectional mode.

  Workaround: None. CSCtx95359

- When you add a "bfd" suffix to the **snmp server host** *x.x.x.x* configuration command, the BFD traps, ciscoBfdSessUp and ciscoBfdSessDown, are not generated.

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- With IGMP snooping enabled, multicast traffic received through a tunnel interface is not forwarded out the Outgoing Interface List.

  Workaround: Disable IGMP snooping. CSCuc65538

- On systems performing multicast routing, a brief increase in CPU consumption occurs every few minutes. In large-scale environments, this CPU increase is more noticeable.

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- When a port connected to a CDP speaker goes down, a small memory leak occurs (typically less than 300 bytes).

  Workaround: Disable CDP on interfaces that may flap frequently. CSCub85948

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  - Skip the vlan.dat check.
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- BFD supports 300ms and time values exceeding (100 * 3).

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  Workaround: Reset the term length to 0 on the vty session. CSCuf08112

- If you configure SNMP proxy and immediately remove it, your switch crashes.

  Workaround: Wait two min before removing the proxy. CSCug69823

- IPv6 Source Guard does not block packets from IP sources that are not in the binding table.

  Workaround: None CSCug79180

Resolved Caveats in Cisco IOS Release 15.2(1)E

- The active supervisor engine crashes when one of the vty sessions displays **power inline details** for a module (with **automore** enabled) and simultaneously the module is reset from the other vty session.

  Workaround: Set term length 0 on the vty sessions. CSCuf08112

  4500E only

- If you have a switch running MST and a second switch running RSTP, a Layer 2 loop results; MST and RSTP are not interoperable.

  The access port on the MST boundary goes into "Type inconsistent" state for MST instance 0, but not for the other instances (VLAN 100 is a member of instance 1).

  Workaround: None. CSCud67457

- When you remove or insert the fan tray, the following message appears:

  ```
  *Jan 21 07:55:08.851: %C4K_IOSMODPORTMAN-6-FANTRAYINSERTEDDETAILED: Fan tray ( S/N:
  Hw: 0.0) has been inserted
  ```

  Workaround: None. CSCue34358

- When using PEAPv1/MSChap from an IOS Supplicant to ACS 5 (and possibly other RADIUS servers), authentication fails.

  Workaround: Use PEAP-GTC or any other method. CSCud66899

- Wireshark might not capture packets egressing a port.

  Workaround: None. CSCud80251

Related Documentation

Although their Release Notes are unique, the 4 platforms (Catalyst 4500, Catalyst 4900, Catalyst ME 4900, and Catalyst 4900M) use the same *Software Configuration Guide*, *Command Reference Guide*, and *System Message Guide*. Refer to the following home pages for additional information:

- Catalyst 4500 Series Switch Documentation Home

  http://www.cisco.com//en/US/products/hw/switches/ps4324/index.html

Hardware Documents

Installation guides and notes including specifications and relevant safety information are available at the following URLs:

- *Catalyst 4500 Series Switches Installation Guide*

  http://www.cisco.com/en/US/docs/switches/lan/catalyst4500/hardware/installation/guide/78-14409-08/4500inst.html

- For information about individual switching modules and supervisors, refer to the *Catalyst 4500 Series Module Installation Guide* at:

  http://www.cisco.com/en/US/docs/switches/lan/catalyst4500/hardware/configuration/notes/OL_25315.html

- *Regulatory Compliance and Safety Information for the Catalyst 4500 Series Switches*

  http://www.cisco.com/en/US/docs/switches/lan/catalyst4500/hardware/regulatory/compliance/78_13233.html

- Installation notes for specific supervisor engines or for accessory hardware are available at:

  http://www.cisco.com/en/US/products/hw/switches/ps4324/prod_installation_guides_list.html

- Catalyst 4900 and 4900M hardware installation information is available at:

  http://www.cisco.com/en/US/products/ps6021/prod_installation_guides_list.html

Software Documentation

Software release notes, configuration guides, command references, and system message guides are available at the following URLs:

- Catalyst 4500 release notes are available at:

  http://www.cisco.com/en/US/products/hw/switches/ps4324/prod_release_notes_list.html

Software documents for the Catalyst 4500 Classic, Catalyst 4500 E-Series, Catalyst 4900 Series, and Catalyst 4500-X Series switches are available at the following URLs:

- *Catalyst 4500 Series Software Configuration Guide*

  http://www.cisco.com/en/US/products/hw/switches/ps4324/products_installation_and_configuration_guides_list.html

- *Catalyst 4500 Series Software Command Reference*

  http://www.cisco.com/en/US/products/hw/switches/ps4324/prod_command_reference_list.html

- *Catalyst 4500 Series Software System Message Guide*

  http://www.cisco.com/en/US/products/hw/switches/ps4324/products_system_message_guides_list.html

Cisco IOS Documentation

Platform-independent Cisco IOS documentation may also apply to the Catalyst 4500 and 4900 switches. These documents are available at the following URLs:

- Cisco IOS configuration guides, Release 12.x

http://www.cisco.com/en/US/products/ps6350/products_installation_and_configuration_guides_list.html

- Cisco IOS command references, Release 12.x

  http://www.cisco.com/en/US/products/ps6350/prod_command_reference_list.html

  You can also use the Command Lookup Tool at:

  http://tools.cisco.com/Support/CLILookup/cltSearchAction.do

- Cisco IOS system messages, version 12.x

  http://www.cisco.com/en/US/products/ps6350/products_system_message_guides_list.html

  You can also use the Error Message Decoder tool at:

  http://www.cisco.com/pcgi-bin/Support/Errordecoder/index.cgi

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This product includes cryptographic software written by Eric Young (eay@cryptsoft.com).

This product includes software written by Tim Hudson (tjh@cryptsoft.com).

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This product includes cryptographic software written by Eric Young (eay@cryptsoft.com). This product includes software written by Tim Hudson (tjh@cryptsoft.com).

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The implementation was written so as to conform with Netscapes SSL.

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Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What’s New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

Subscribe to the *What’s New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS Version 2.0.

This document is to be used in conjunction with the documents listed in the “Related Documentation” section.

Release Notes for the Catalyst 4500 Series Switch, Cisco IOS Release 15.2(1)Ex