Release Notes for Cisco IOS Release 15.4(1)SY4

February 26, 2018

Note For general product information about the Catalyst 6500 series switches, refer to these product bulletins:
http://www.cisco.com/c/en/us/products/switches/catalyst-6500-series-switches/literature.html

The most current version of this document is available on Cisco.com at this URL:

http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst6500/ios/15-4SY/release_notes/release_notes.html

Caution Cisco IOS supports redundant configurations with identical supervisor engines. If they are not identical, one supervisor engine will boot first and become active and hold the other in a reset condition.

Contents

This publication consists of these sections:

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Chronological List of Releases

Note
- See the "Images and Feature Sets" section on page 47 for information about which releases are deferred.

This is a chronological list of the 15.4SY releases:
- Release 15.4(1)SY4—26 February 2018

- Release 15.4(1)SY3— 02 November 2017

- Release 15.4(1)SY2— 02 June 2017

- Release 15.4(1)SY1—13 December 2016

- Release 15.4(1)SY—09 September 2016

Supported Hardware

This section describes the hardware supported in Release 15.4(1)SY and later releases:
- Supervisor Engines, PFCs, DFCs, and CFC, page 3

- 40-Gigabit Ethernet Switching Modules, page 9

- 10-Gigabit Ethernet Switching Modules, page 10

- Cisco Catalyst 6880-X Series Extensible Fixed Aggregation Switches, page 18

- Cisco Catalyst 6840-X Series Fixed Aggregation Switches, page 18

- Cisco Catalyst 6807-XL Modular Switch, page 19, page 19

- Gigabit Ethernet Switching Modules, page 23

- 10/100/1000 Ethernet Switching Modules, page 25

- Power over Ethernet Daughtercards, page 28

- Transceivers, page 28

- Service Modules, page 38

- Power Supplies, page 40

- Chassis, page 42

> **Note** Enter the **show power** command to display current system power usage.

Supervisor Engines, PFCs, DFCs, and CFC

Supervisor Engine 6T

Product ID (append "=" for spares)	Product Description	Minimum Software Version
C6800-SUP6T	Supervisor Engine 6T with PFC4	15.3(1)SY
C6800-SUP6T-XL	Supervisor Engine 6T with PFC4XL	

Features

- One of these policy feature cards:
  - Policy Feature Card 4XL (PFC4XL)
  - Policy Feature Card 4 (PFC4)
    See the "Policy Feature Cards Supported with Supervisor Engine 6T" section.
- Supports up to 6-Tbps switch fabric connectivity.
- 4-GB DDR3 for both XL and Non-XL Supervisors.
- Internal 4-GB eUSB (bootdisk:).
- One external USB Type-A slot (disk0:)
- Management Port – Supports both
  - RJ45 and
  - SFP, which supports following transceivers:
    GLC-SX-MM
    GLC-LH-SM
    GLC-ZX-SM
    GLC-SX-MMD
    GLC-LH-SMD
    GLC-EX-SMD
    GLC-ZX-SMD
    GLC-BX-U
    GLC-BX-D
- Console ports supports below two variants:

- RJ45 Serial

- USB port Type-B

- Front panel supervisor uplink ports :
8 x 1-Gb / 10-Gb Small Form Factor Pluggable Plus (SFP+) ports (Ports numbering from TenG 1 to 8)
2 x 40-Gb QSFP ports (Ports numbering from FortyG 9-10)

- Supervisor Slot Occupies the Supervisor slots as follows:

  - 7 Slot 6807-XL chassis – slots 3 and 4 [15.3(1)SY onwards]

  - 4 Slot WS-C6504-E chassis: Slots 1 and 2 [15.3(1)SY1 onwards]

  - 6 Slot WS-C6506-E chassis: Slots 5 and 6 [15.3(1)SY1 onwards]

  - 9 Slot WS-C6509-E chassis: Slots 5 and 6 [15.3(1)SY1 onwards]

  - 3 Slot WS-C6503-E chassis: Slots 1 and 2 [15.3(1)SY2 onwards]

  - 9VE Slot WS-C6509-V-E chassis: Slots 5 and 6 [15.3(1)SY2 onwards]

  - 13 Slot WS-C6513-E chassis: Slots 7 and 8 [15.3(1)SY2 onwards]

- NVRAM: 4 MB

- Power Consumptions

  - Standard: 341 W maximum

  - XL: 354 W maximum

- Receive and transmit queues

  - Default: 1p7q4t

  - Configurable: 2p6q4t

- For further details, see this publication:
http://www.cisco.com/c/en/us/products/collateral/interfaces-modules/catalyst-6800-series-supervisor-engine-6t/datasheet-c78-736408.html

Supervisor Engine 2T-10GE

Product ID (append "=" for spares)	Product Description	Minimum Software Version
VS-S2T-10G-XL	Supervisor Engine 2T-10GE with PFC4XL	15.0(1)SY
VS-S2T-10G	Supervisor Engine 2T-10GE with PFC4	

Features

- One of these policy feature cards:

  - Policy Feature Card 4XL (PFC4XL)

  - Policy Feature Card 4 (PFC4)

  See the "Policy Feature Cards Supported" section on page 5.

- Supports 2-Tbps switch fabric connectivity.

- 2-GB DRAM.

- Internal 1-GB bootflash (**bootdisk:**).
- One external slot:
    - **disk0:**
    - For CompactFlash Type II flash PC cards sold by Cisco Systems, Inc., for use in Supervisor Engine 2T-10GE.
- Console ports:
    - EIA/TIA-232 (RS-232) port
    - USB port
- Ports 1, 2, and 3:
    - QoS architecture: **2q4t/1p3q4t**
    - Ports 1, 2, and 3: Gigabit Ethernet SFP (fiber SFP or 1000 Mbps RJ-45 SFP)
- Ports 4 and 5:
    - Support for 10-Gigabit Ethernet X2 tranceivers
    - QoS architecture:
        - With ports 1, 2, and 3 enabled: **2q4t/1p3q4t**
        - With ports 1, 2, and 3 disabled: **8q4t/1p7q4t**
- One port group: ports 1 through 5

Note See the *Supervisor Engine 2T-10GE Connectivity Management Processor Configuration Guide* for information about the 10/100/1000 Mbps RJ-45 port.

- Connectivity Management Processor (CMP)—See this publication:

    http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst6500/cmp_configuration/guide/sup2T_10GEcmp.html

Supervisor Engine 2T-10GE Restrictions

- The 1-Gigabit Ethernet ports and the 10-Gigabit Ethernet ports have the same QoS port architecture (**2q4t/1p3q4t**) unless you disable the 1-Gigabit Ethernet ports with the **platform qos 10g-only** global configuration command. With the 1-Gigabit Ethernet ports disabled, the QoS port architecture of the 10-Gigabit Ethernet ports is **8q4t/1p7q4t**.
- In RPR redundancy mode, the ports on a Supervisor Engine 2T-10GE in standby mode are disabled.

Policy Feature Cards Supported

Policy Feature Card 4 Guidelines and Restrictions

- The PFC4 supports a theoretical maximum of 131,072 (128K) MAC addresses with 118,000 (115.2K) MAC addresses as the recommended maximum.

- The PFC4 partitions the hardware FIB table to route IPv4 unicast, IPv4 multicast, MPLS, and IPv6 unicast and multicast traffic in hardware. Traffic for routes that do not have entries in the hardware FIB table are processed by the route processor in software.

  The defaults for XL mode are:

  - IPv4 unicast and MPLS: 512,000 routes

  - IPv4 multicast and IPv6 unicast and multicast: 256,000 routes

  The defaults for Non-XL mode are:

  - IPv4 unicast and MPLS: 192,000 routes

  - IPv4 multicast and IPv6 unicast and multicast: 32,000 routes

  > ✎
  > **Note** The size of the global internet routing table plus any local routes might exceed the non-XL mode default partition sizes.

  These are the theoretical maximum numbers of routes for the supported protocols (the maximums are not supported simultaneously):

  - XL mode:

    • IPv4 and MPLS: Up to 1,007,000 routes

    • IPv4 multicast and IPv6 unicast and multicast: Up to 503,000 routes

  - Non-XL mode:

    • IPv4 and MPLS: Up to 239,000 routes

    • IPv4 multicast and IPv6 unicast and multicast: Up to 119,000 routes

  Enter the **platform cef maximum-routes** command to repartition the hardware FIB table. IPv4 unicast and MPLS require one hardware FIB table entry per route. IPv4 multicast and IPv6 unicast and multicast require two hardware FIB table entries per route. Changing the partition for one protocol makes corresponding changes in the partitions of the other protocols. You must enter the **reload** command to put configuration changes made with the **platform cef maximum-routes** command into effect.

  > ✎
  > **Note** With a non-XL-mode system, if your requirements cannot be met by repartitioning the hardware FIB table, upgrade components as necessary to operate in XL mode.

- You cannot use one type of PFC on one supervisor engine and a different type on the other supervisor engine for redundancy. You must use identical policy feature cards for redundancy.

- PFC4—These restrictions apply to a configuration with a PFC4 and these DFCs:

  - PFC4 and DFC4—No restrictions (PFC4 mode).

  - PFC4 and DFC4XL—The PFC4 restricts DFC4XL functionality: the DFC4XL functions as a DFC4 (PFC4 mode).

- PFC4XL—These restrictions apply to a configuration with a PFC4XL and these DFCs:

  - PFC4XL and DFC4—PFC4XL functionality is restricted by the DFC4: after a reload with a DFC4-equipped module installed, the PFC4XL functions as a PFC4 (PFC4 mode).

  - PFC4XL and DFC4XL—No restrictions (PFC4XL mode).

- Switching modules that you install after bootup that are equipped with a DFC that imposes a more restricted PFC mode than the current PFC mode remain powered down.

- You must reboot to use a switching module equipped with a DFC that imposes a more restricted PFC mode than the current PFC mode.

- Enter the **show platform hardware pfc mode** command to display the PFC mode.

- FIB TCAM exception may be thrown in case of a route churn where TCAM utilization is more than 80% of the total utilization. This limitation is applicable to DFC TCAM on XL line cards. If FIB TCAM exception is thrown for a transit route for IPv4 or IPv6 or MPLS traffic, the route does not get installed in FIB and connectivity gets affected. This can result in elevated CPU usage due to software switching.

Policy Feature Card 4XL

Product ID (append "=" for spares)	Product Description	Minimum Software Version
VS-F6K-PFC4XL	Policy Feature Card 4XL (PFC4XL)	
	Note Use VS-F6K-PFC4XL= to upgrade to a PFC4XL.	
	With Supervisor Engine 2T-10GE	15.0(1)SY
	With Supervisor Engine 6T	15.3(1)SY

Policy Feature Card 4

Product ID (append "=" for spares)	Product Description	Minimum Software Version
VS-F6K-PFC4	Policy Feature Card 4 (PFC4)	
	With Supervisor Engine 2T-10GE	15.0(1)SY
	With Supervisor Engine 6T	15.3(1)SY

Distributed Forwarding Cards Supported

Note
- See the "Policy Feature Cards Supported" section on page 5 for Policy Feature Cards (PFC) and Distributed Forwarding Card (DFC) restrictions.

- The DFC4 uses memory that is installed on the switching module.

- For more information about the DFCs, see these documents:

  http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst6500/hardware/Config_Notes/OL_24918.html

http://www.cisco.com/c/en/us/products/collateral/interfaces-modules/catalyst-6500-series-supervisor-engine-2t/data_sheet_c78-648214.html

Distributed Forwarding Card 4XL

Product ID (append "=" for spares)	Product Description	Minimum Software Version
WS-F6K-DFC4-EXL WS-F6K-DFC4-AXL	Distributed Forwarding Card 4XL (DFC4XL)	
	With Supervisor Engine 2T-10GE	15.0(1)SY
	With Supervisor Engine 6T	15.3(1)SY

Distributed Forwarding Card 4

Product ID (append "=" for spares)	Product Description	Minimum Software Version
WS-F6K-DFC4-E WS-F6K-DFC4-A	Distributed Forwarding Card 4 (DFC4)	
	With Supervisor Engine 2T-10GE	15.0(1)SY
	With Supervisor Engine 6T	15.3(1)SY

Centralized Forwarding Card (WS-F6700-CFC)

Product ID (append "=" for spares)	Product Description	Minimum Software Version
WS-F6700-CFC	Centralized Forwarding Card (CFC) for use on CEF720 modules	
	With Supervisor Engine 2T-10GE	15.0(1)SY

40-Gigabit Ethernet Switching Modules

WS-X6904-40G-2T 4-Port 40-Gigabit Ethernet Switching Module

Policy Feature Cards Supported, page 5

Product ID (append "=" for spares)	Product Description	Minimum Software Version
WS-X6904-40G-2TXL (Has WS-F6K-DFC4-EXL)	4-port 40-Gigabit Ethernet module	
	With Supervisor Engine 2T-10GE	15.0(1)SY1
WS-X6904-40G-2T (Has WS-F6K-DFC4-E)	With Supervisor Engine 6T	15.3(1)SY

- WS-X6904-40G-2T and WS-X6904-40G-2TXL are the orderable product IDs.

- The front panel is labeled WS-X6904-40G.

- Cisco IOS software commands display WS-X6904-40G with either WS-F6K-DFC4-E or WS-F6K-DFC4-EXL.

- Has hardware abstraction layer (HAL) support.

- QoS port architecture (Rx/Tx): **1p7q4t** or **2p6q4t/1p7q4t** or **2p6q4t**

- Dual switch-fabric connections:

  - Fabric Channel #1: Ports 1 and 2 or 5 through 12

  - Fabric Channel #2: Ports 3 and 4 or 13 through 20

- Number of ports: 4 or 16
  Number of port groups: 2
  Port per port group:
  –Ports 1 and 2 or 5 through 12
  –Ports 3 and 4 or 13 through 20

- dCEF2T.

- In a 3-slot chassis, supported only with WS-C6503-E hardware revision 1.3 or higher.

- Upgrade to Release15.0(1)SY1 or later before installing WS-X6904-40G (see the "EFSU Compatibility" section on page 48).

- Each bay can support a CFP transceiver (supports one 40 Gigabit Ethernet port) or a FourX adapter (supports four 10 Gigabit Ethernet SFP+ transceivers).

- WS-X6904-40G supported modes (default mode is oversubscribed):

  - 40 Gigabit Ethernet oversubscribed mode:
    —Four 40 Gigabit Ethernet ports
    —Ports 1 through 4

  - 10 Gigabit Ethernet oversubscribed mode:
    —Sixteen 10 Gigabit Ethernet ports
    —Ports 5 through 20

  - Mixed 10/40 Gigabit Ethernet oversubscribed mode:

    —Left bays:

      –Either two 40 Gigabit Ethernet ports (1 and 2)

–Or eight 10 Gigabit Ethernet ports (5 through 12)

—Right bays:

–Either two 40 Gigabit Ethernet ports (3 and 4)

–Or eight 10 Gigabit Ethernet ports (13 through 20)

– Performance mode:

—Configurable per module or per bay:

no hw-module slot *slot_number* **oversubscription** [**port-group** *port_group_number*]

—Supported in the top left bay and top right bay.

—Any of these combinations:

–40 Gigabit Ethernet port 1 (top left bay) and port 3 (top right bay)

–10 Gigabit Ethernet ports 5 through 9 (top left bay) and ports 13 through 16 (top right bay)

–Top left bay: 40 Gigabit Ethernet port 1 or 10 Gigabit Ethernet ports 5 through 9
Top right bay: 40 Gigabit Ethernet port 3 or 10 Gigabit Ethernet ports 13 through 16

– 40 Gigabit Ethernet performance mode, 10 Gigabit Ethernet oversubscribed mode:

—Either of these combinations:

–Top left bay: 40 Gigabit Ethernet port 1
Right bays: eight 10 Gigabit Ethernet ports (13 through 20)

–Left bays: eight 10 Gigabit Ethernet ports (5 through 13)
Top right bay: 40 Gigabit Ethernet port 3

– 40 Gigabit Ethernet oversubscribed mode, 10 Gigabit Ethernet performance mode:

—Either of these combinations:

–Top left bay: four 10 Gigabit Ethernet ports (5 through 9)
Right bays: two 40 Gigabit Ethernet ports (3 and 4)

–Left bays: two 40 Gigabit Ethernet ports (1 and 2)
Top right bay: four 10 Gigabit Ethernet ports (13 through 16)

• For more information about WS-X6904-40G, see these publications:

40 Gigabit Ethernet on Cisco Catalyst 6500 Series Switches: How It Works

40 Gigabit Ethernet Interface Module for Cisco Catalyst 6500 Series Switches Data Sheet

10-Gigabit Ethernet Switching Modules

• Catalyst C6800-8P10G, Catalyst C6800-8P10G-XL, page 11

• Catalyst C6800-16P10G, Catalyst C6800-16P10G-XL, page 12

• Catalyst C6800-32P10G, Catalyst C6800-32P10G-XL, page 13

• WS-X6908-10GE 8-Port 10-Gigabit Ethernet X2 Switching Module, page 14

• WS-X6816-10T-2T, WS-X6716-10T 16-Port 10-Gigabit Ethernet Copper Switching Module, page 15

• WS-X6816-10G-2T, WS-X6716-10G 16-Port 10-Gigabit Ethernet X2 Switching Module, page 16

• WS-X6704-10GE 4-Port 10-Gigabit Ethernet XENPAK Switching Module, page 17

Catalyst C6800-8P10G, Catalyst C6800-8P10G-XL

Product ID (append "=" for spares)	Product Description	Minimum Software Version
C6800-8P10G-XL	8-port 10-Gigabit Ethernet SFP+ module	
C6800-8P10G	With Supervisor Engine 2T-10GE	15.2(1)SY
	With Supervisor Engine 6T	15.3(1)SY

- C6800-8P10G and C6800-8P10G-XL are the orderable product IDs

- Cisco IOS software commands display C6800-8P10G or C6800-8P10G-XL

- QoS Architecture

    - Receive:
    1p7q4t (default)
    2p6q4t (configurable)

    - Transmit:
    1p7q4t (default)
    2p6q4t (configurable)

- Number of ports: 8

- Port Groups: 2

    - 2 port-sets per port group

    - Port-group 1: 1, 2, 3, 4

    - Port-group 2: 5, 6, 7, 8

- Oversubscription: Not Applicable

- Upgrade to Release15.2(1)SY or later before installing either C6800-8P10G or C6800-8P10G-XL

- Supported modes

    - In C6807-XL: 8 ports: line rate 1:1

    - In Catalyst 6500-E: 8 ports: line rate 1:1

- Number of forwarding engines: 1

- Port Buffers

    - 500 MB per port (Egress)

    - 2.5 MB per port (Ingress)

Catalyst C6800-16P10G, Catalyst C6800-16P10G-XL

Product ID (append "=" for spares)	Product Description	Minimum Software Version
C6800-16P10G-XL	16-port 10-Gigabit Ethernet SFP+ module	
C6800-16P10G	With Supervisor Engine 2T-10GE	15.2(1)SY
	With Supervisor Engine 6T	15.3(1)SY

- C6800-16P10G and C6800-16P10G-XL are the orderable product IDs

- Cisco IOS software commands display C6800-16P10G or C6800-16P10G-XL

- QoS Architecture

    – Receive:
      1p7q4t (default)
      2p6q4t (configurable)

    – Transmit:
      1p7q4t (default)
      2p6q4t (configurable)

- Number of ports: 16

- Port Groups: 2

    – 2 port-sets per port group

    – Port-group 1:
      1, 2, 3, 4
      5, 6, 7, 8

    – Port-group 2:
      9, 10, 11, 12
      13, 14, 15, 16

- Performance Mode: Yes, per-port group

- Upgrade to Release15.2(1)SY or later before installing either C6800-16P10G or C6800-16P10G-XL

- Supported modes

    – In C6807-XL:
      16 ports: oversubscription mode 2:1
      8 ports: performance mode 1:1

    – In Catalyst 6500-E:
      16 ports: oversubscription mode 2:1
      8 ports: performance mode 1:1

- Number of forwarding engines: 1
- Port Buffers
    - Oversubscription mode:
      250 MB per port (Egress)
      1.25 MB per port (Ingress)
    - Performance mode:
      500 MB per port (Egress)
      2.5 MB per port (Ingress)

Catalyst C6800-32P10G, Catalyst C6800-32P10G-XL

Product ID (append "=" for spares)	Product Description	Minimum Software Version
C6800-32P10G-XL	32-port 10-Gigabit Ethernet SFP+ module	
C6800-32P10G	With Supervisor Engine 2T-10GE	15.2(1)SY
	With Supervisor Engine 6T	15.3(1)SY

- C6800-32P10G and C6800-32P10G-XL are the orderable product IDs
- Cisco IOS software commands display C6800-32P10G or C6800-32P10G-XL
- QoS Architecture
    - Receive:
      1p7q4t (default)
      2p6q4t (configurable)
    - Transmit:
      1p7q4t (default)
      2p6q4t (configurable)
- Number of ports: 32
- Port Groups: 4
    - 2 port-sets per port group
    - Port-group 1:
      1, 3, 5, 7
      9,11, 13, 15
    - Port-group 2:
      2,4,6,8
      10, 12, 14, 16
    - Port-group 3:
      17,19,21,23
      25, 27, 29, 31
    - Port-group 4:
      18,20,22,24
      26, 28, 30, 32

- Performance Mode: Yes, per-port group

- Upgrade to Release15.2(1)SY or later before installing either C6800-32P10G or C6800-32P10G-XL

- Supported modes

  – In C6807-XL:
  32 ports: oversubscription mode 2:1
  16 ports: performance mode 1:1

  – In Catalyst 6500-E:
  32 ports: oversubscription mode 4:1
  16 ports: performance mode 2:1

- Number of forwarding engines: 2

- Port Buffers

  – Oversubscription mode:
  250 MB per port (Egress)
  1.2 MB per port (Ingress)

  – Performance mode:
  500 MB per port (Egress)
  2.5 MB per port (Ingress)

WS-X6908-10GE 8-Port 10-Gigabit Ethernet X2 Switching Module

Product ID (append "=" for spares)	Product Description	Minimum Software Version
WS-X6908-10G-XL (Has WS-F6K-DFC4-EXL)	8-port 10-Gigabit Ethernet X2 module	
	With Supervisor Engine 2T-10GE	15.0(1)SY
WS-X6908-10G (Has WS-F6K-DFC4-E)	With Supervisor Engine 6T	15.3(1)SY

- WS-X6908-10G and WS-X6908-10G-XL are the orderable product IDs.

- The front panel is labeled WS-X6908-10GE.

- Cisco IOS software commands display WS-X6908-10GE with either WS-F6K-DFC4-E or WS-F6K-DFC4-EXL.

- dCEF2T

- QoS port architecture (Rx/Tx): **8q4t/1p7q4t**

- Dual switch-fabric connections
  Fabric Channel #1: Ports 2, 3, 6, 8
  Fabric Channel #2: Ports 1, 4, 5, 7

- Number of ports: 8
  Number of port groups: 8
  Port ranges per port group: 1 port in each group

- In a 3-slot chassis, supported only with WS-C6503-E hardware revision 1.3 or higher.

WS-X6816-10T-2T, WS-X6716-10T 16-Port 10-Gigabit Ethernet Copper Switching Module

Product ID (append "=" for spares)	Product Description	Minimum Software Version
WS-X6816-10T-2TXL (Has WS-F6K-DFC4-EXL) **WS-X6716-10T-3CXL** (Must be upgraded with WS-F6K-DFC4-EXL=) **WS-X6816-10T-2T** (Has WS-F6K-DFC4-E) **WS-X6716-10T-3C** (Must be upgraded with WS-F6K-DFC4-E=)	16-port 10-Gigabit Ethernet copper (RJ-45) module	
	With Supervisor Engine 2T-10GE	15.0(1)SY
	With Supervisor Engine 6T	15.3(1)SY

- The orderable product IDs are:
  - WS-X6816-10T-2TXL
  - WS-X6816-10T-2T
  - WS-X6716-10T-3CXL
  - WS-X6716-10T-3C

- The front panel is labeled WS-X6716-10T.

- Cisco IOS software commands display WS-X6716-10T with any DFC.

- QoS port architecture (Rx/Tx):
  - Oversubscription mode: **1p7q2t/1p7q4t**
  - Performance mode: **8q4t/1p7q4t**

- Dual switch-fabric connections
  Fabric Channel #1: ports 1–8
  Fabric Channel #2: ports 9–16

- Number of ports: 16
  Number of port groups: 4
  Port ranges per port group: 1–4, 5–8, 9–12, 13–16

- When not configured in oversubscription mode, supported in virtual switch links.

- To configure port oversubscription, use the **hw-module slot** command.

WS-X6816-10G-2T, WS-X6716-10G 16-Port 10-Gigabit Ethernet X2 Switching Module

Product ID (append "=" for spares)	Product Description	Minimum Software Version
WS-X6816-10G-2TXL (Has WS-F6K-DFC4-EXL) **WS-X6716-10G-3CXL** (Must be upgraded with WS-F6K-DFC4-EXL=) **WS-X6816-10G-2T** **(Has** WS-F6K-DFC4-E**)** **WS-X6716-10G-3C** (Must be upgraded with WS-F6K-DFC4-E=)	16-port 10-Gigabit Ethernet X2 module	
	With Supervisor Engine 2T-10GE	15.0(1)SY
	With Supervisor Engine 6T	15.3(1)SY

- The orderable product IDs are:
    - WS-X6816-10G-2TXL
    - WS-X6816-10G-2T
    - WS-X6716-10G-3CXL
    - WS-X6716-10G-3C
- The front panel is labeled WS-X6716-10GE.
- Cisco IOS software commands display WS-X6716-10GE with any DFC.
- QoS port architecture (Rx/Tx):
    - Oversubscription mode: **1p7q2t/1p7q4t**
    - Performance mode: **8q4t/1p7q4t**
- Dual switch-fabric connections
  Fabric Channel #1: ports 1–8
  Fabric Channel #2: ports 9–16
- Number of ports: 16
  Number of port groups: 4
  Port ranges per port group: 1–4, 5–8, 9–12, 13–16
- When not configured in oversubscription mode, supported in virtual switch links.

- To configure port oversubscription, use the **hw-module slot** command.

WS-X6704-10GE 4-Port 10-Gigabit Ethernet XENPAK Switching Module

Product ID (append "=" for spares)	Product Description	Minimum Software Version
WS-X6704-10G	4-port 10-Gigabit Ethernet XENPAK With Supervisor Engine 2T-10GE	15.0(1)SY
	With Supervisor Engine 6T ✎ **Note** Supervisor Engine 6T is supported with DFC4/4XL, it requires minimum1GB RAM.	15.3(1)SY

- WS-X6704-10GE requires one of the following:
    - With Supervisor Engine 2T-10GE:
        - WS-F6K-DFC4-AXL
        - WS-F6K-DFC4-A
        - WS-F6700-CFC
    - With Supervisor Engine 6T:
        - WS-F6K-DFC4-AXL
        - WS-F6K-DFC4-A
        Requires 1 GB DRAM with SUP6T. See this publication:
        http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst6500/hardware/Config_Notes/78_12409.html
- Requires 512-MB DRAM with a WS-F6700-CFC (CSCtk82279). See this publication:

    http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst6500/hardware/Config_Notes/78_12409.html

- QoS port architecture (Rx/Tx): **8q8t/1p7q8t**

- Dual switch-fabric connections:
    Fabric Channel #1: Ports 3 and 4
    Fabric Channel #2: Ports 1 and 2

- Number of ports: 4
    Number of port groups: 4
    Port ranges per port group: 1 port in each group

- WS-X6704-10G is the orderable product ID.

- The front panel is labeled WS-X6704-10GE.

- Cisco IOS software commands display WS-X6704-10GE with any DFC.

- On WS-X6704-10GE ports, STP BPDUs are not exempt from Traffic Storm Control multicast suppression. Do not configure multicast suppression on STP-protected WS-X6704-10GE ports that interconnect network devices. (CSCsg86315)

Cisco Catalyst 6880-X Series Extensible Fixed Aggregation Switches

Product ID (append "=" for spares)	Product Description	Minimum Software Version
C6880-X-LE	16 10-Gigabit (SFP+)/1-Gigabit ports (SFP), four port card slots, two power supply slots. It supports standard FIB/ACL/NetFlow tables.	15.1(2)SY1
C6880-X	16 10-Gigabit (SFP+)/1-Gigabit ports (SFP), four port card slots, two power supply slots. It supports large FIB/ACL/NetFlow tables.	
C6880-X-LE-16P10G[1]	Multi rate port card with standard tables. This module has 16 10-Gigabit or 1-Gigabit module slots which support 1-Gigabit SFPs or 10-Gigabit SFP+ modules. Supported only on the Catalyst 6880-X-LE switch model.	15.1(2)SY2
C6880-X-16P10G[1]	Multi rate port card with XL tables. This module has 16 10-Gigabit or 1-Gigabit module slots which support 1-Gigabit SFPs or 10-Gigabit SFP+s modules. Supported only on the Catalyst 6880-X switch model.	

Note See these publications for more information:

http://www.cisco.com/c/en/us/products/collateral/switches/catalyst-6880-x-switch/data_sheet_c78-728228.html

http://www.cisco.com/c/en/us/products/collateral/switches/catalyst-6880-x-switch/white_paper_c11-728540.html

http://www.cisco.com/c/en/us/products/collateral/switches/catalyst-6880-x-switch/white_paper_c11-728541.html

1. These port cards are supported only on the specified switch models and are not interoperable.

Cisco Catalyst 6840-X Series Fixed Aggregation Switches

Product ID (append "=" for spares)	Product Description	Minimum Software Version
C6816-X-LE	16 10-Gigabit (SFP+)/1-Gigabit ports (SFP), two power supply slots. It supports standard FIB/ACL/NetFlow tables.	15.2(2)SY
C6832-X-LE	32 10-Gigabit (SFP+)/1-Gigabit ports (SFP), two power supply slots. It supports standard FIB/ACL/NetFlow tables.	

Product ID (append "=" for spares)	Product Description	Minimum Software Version
C6824-X-LE-40G	24 10-Gigabit (SFP+)/1-Gigabit ports (SFP), 2 40-Gigabit(QSFP), two power supply slots. It supports standard FIB/ACL/NetFlow tables.	15.2(2)SY
C6840-X-LE-40G	40 10-Gigabit (SFP+)/1-Gigabit ports (SFP), 2 40-Gigabit(QSFP), two power supply slots. It supports standard FIB/ACL/NetFlow tables.	

Note   See these publications for more information:

http://www.cisco.com/c/en/us/products/collateral/switches/catalyst-6800-series-switches/datasheet-c78-734470.html

These port cards are supported only on the specified switch models and are not interoperable.

Cisco Catalyst 6807-XL Modular Switch

Product ID (append "=" for spares)	Product Description	Minimum Software Version
C6807-XL	7-slot modular chassis. The switch supports redundant power supply modules (AC-input), redundant supervisor engines, fan-tray, power supply convertor modules, clock modules, and voltage termination enhanced (VTT-E) modules	15.1(2)SY3

Note   See these publications for more information:

http://www.cisco.com/c/en/us/products/collateral/switches/catalyst-6807-xl-switch/data_sheet_c78-728229.html

http://www.cisco.com/c/en/us/products/collateral/switches/catalyst-6807-xl-switch/white_paper_c11-728264.html

IA client maximum values for a Catalyst 6500 and Catalyst 6807-XL switch with Supervisor 6T:

Value Description:	Maximum Value	Software Version
Maximum IA client ports	2016 ports across 42 Catalyst 6800ia access switches	15.3(1)SY1
Maximum IA client switches	42 (defined by IA client FEX number 1–42 range.)	
Maximum Catalyst 6800ia access switches per IA client stack	5 • An IA client stack acts as single switch unit. • Instant access only supports connection with stacking cables to form a stack. • With an IA client that has multiple Catalyst 6800ia access switches, the switches in the stack assign incrementing switch numbers to themselves (automatic stacking capability). • If you add Catalyst 6800ia access switches to a configured IA client, the additional switches assign incrementing switch numbers to themselves. • The IA client configuration does not persist if the access switch number changes.	

IA client maximum values for a Catalyst 6500 and Catalyst 6807-XL switch with Supervisor 2T:

Value Description:	Maximum Value	Software Version
Maximum IA client ports	1500 ports	15.2(1)SY1[1]
Maximum IA client switches	32	
Maximum Catalyst 6800ia access switches per IA client stack	5 • An IA client stack acts as single switch unit. • Instant access only supports connection with stacking cables to form a stack. • With an IA client that has multiple Catalyst 6800ia access switches, the switches in the stack assign incrementing switch numbers to themselves (automatic stacking capability). • If you add Catalyst 6800ia access switches to a configured IA client, the additional switches assign incrementing switch numbers to themselves. • The IA client configuration does not persist if the access switch number changes.	

1. The scale for Cisco IOS Releases 15.2(1)SY and 15.2(1)SY0a is 1200 ports with 25 Client Switches and 5 per IA Client stack.

IA client maximum values for Catalyst 6840-X switch

Value Description:	Maximum Value	Software Version
Maximum IA client ports	1500 ports across 32 Catalyst 6800ia access switches	15.2(2)SY
Maximum IA client switches	32	
Maximum Catalyst 6800ia access switches per IA client stack	5 • An IA client stack acts as single switch unit. • Instant access only supports connection with stacking cables to form a stack. • With an IA client that has multiple Catalyst 6800ia access switches, the switches in the stack assign incrementing switch numbers to themselves (automatic stacking capability). • If you add Catalyst 6800ia access switches to a configured IA client, the additional switches assign incrementing switch numbers to themselves. • The IA client configuration does not persist if the access switch number changes.	

IA client maximum values for Catalyst 6880-X switch

Value Description:	Maximum Value	Software Version
Maximum IA client ports	2016 ports across 42 Catalyst 6800ia access switches	15.2(1)SY
Maximum IA client switches	42 (defined by IA client FEX number 1–42 range.)	
Maximum Catalyst 6800ia access switches per IA client stack	5 • An IA client stack acts as single switch unit. • Instant access only supports connection with stacking cables to form a stack. • With an IA client that has multiple Catalyst 6800ia access switches, the switches in the stack assign incrementing switch numbers to themselves (automatic stacking capability). • If you add Catalyst 6800ia access switches to a configured IA client, the additional switches assign incrementing switch numbers to themselves. • The IA client configuration does not persist if the access switch number changes.	

Gigabit Ethernet Switching Modules

WS-X6848-SFP-2T, WS-X6748-SFP 48-Port Gigabit Ethernet SFP Switching Module

Product ID (append "=" for spares)	Product Description		Minimum Software Version
WS-X6848-SFP-2TXL (has WS-F6K-DFC4-AXL)	48-port Gigabit Ethernet SFP		
		With Supervisor Engine 2T-10GE	15.0(1)SY
WS-X6848-SFP-2T (has WS-F6K-DFC4-A)		With Supervisor Engine 6T	15.3(1)SY
WS-X6748-SFP (with WS-F6700-CFC, or upgraded with WS-F6K-DFC4-AXL or WS-F6K-DFC4-A)			

- WS-X6748-SFP requires one of the following:
    - With Supervisor Engine 2T-10GE:
    - WS-F6K-DFC4-AXL
    - WS-F6K-DFC4-A
    - WS-F6700-CFC
    - With Supervisor Engine 6T:
    - WS-F6K-DFC4-AXL
    - WS-F6K-DFC4-A
- QoS architecture: **2q8t/1p3q8t**
- Dual switch-fabric connections
  Fabric Channel #1: Ports 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48
  Fabric Channel #2: Ports 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47
- Number of ports: 48
  Number of port groups: 4
  Port ranges per port group:
  1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23
  2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24
  25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47
  26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48
- On WS-X6848-SFP-2T and WS-X6748-SFP ports, STP BPDUs are not exempt from Traffic Storm Control multicast suppression. Do not configure multicast suppression on STP-protected WS-X6848-SFP-2T or WS-X6748-SFP ports that interconnect network devices.

WS-X6824-SFP-2T, WS-X6724-SFP 24-Port Gigabit Ethernet SFP Switching Module

Product ID (append "=" for spares)	Product Description	Minimum Software Version
WS-X6824-SFP-2TXL (Has WS-F6K-DFC4-AXL)	24-port Gigabit Mbps Ethernet SFP	
WS-X6824-SFP-2T (Has WS-F6K-DFC4-A)	With Supervisor Engine 2T-10GE	15.0(1)SY
WS-X6724-SFP (with WS-F6700-CFC, or upgraded with WS-F6K-DFC4-AXL or WS-F6K-DFC4-A)	With Supervisor Engine 6T	15.3(1)SY

- WS-X6724-SFP requires one of the following:
    - With Supervisor Engine 2T-10GE:
    - WS-F6K-DFC4-AXL
    - WS-F6K-DFC4-A

- WS-F6700-CFC

    – With Supervisor Engine 6T:

- WS-F6K-DFC4-AXL

- WS-F6K-DFC4-A

- QoS architecture: **2q8t/1p3q8t**

- Number of ports: 24
  Number of port groups: 2
  Port ranges per port group: 1–12, 13–24

- On WS-X6824-SFP-2T and WS-X6724-SFP ports, STP BPDUs are not exempt from Traffic Storm Control multicast suppression. Do not configure multicast suppression on STP-protected WS-X6824-SFP-2T or WS-X6724-SFP ports that interconnect network devices.

10/100/1000 Ethernet Switching Modules

These sections describe the supported 10/100/1000 Ethernet switching modules:

- Catalyst C6800-48P-TX, Catalyst C6800-48P-TX-XL, Catalyst C6800-48P-SFP, Catalyst C6800-48P-SFP-XL, page 25

- WS-X6848-TX-2T, WS-X6748-GE-TX, page 26

- WS-X6148E-GE-45AT, page 27

- WS-X6148A-GE-TX, page 27

Catalyst C6800-48P-TX, Catalyst C6800-48P-TX-XL, Catalyst C6800-48P-SFP, Catalyst C6800-48P-SFP-XL

Product ID (append "=" for spares)	Product Description	Minimum Software Version
C6800-48P-TX-XL	48-port 10/100/1000 RJ-45	
C6800-48P-TX	With Supervisor Engine 2T-10GE	15.2(1)SY
	With Supervisor Engine 6T	15.3(1)SY

Product ID (append "=" for spares)	Product Description	Minimum Software Version
C6800-48P-SFP-XL	48-port 10/100/1000 SFP	
C6800-48P-SFP	With Supervisor Engine 2T-10GE	15.2(1)SY
	With Supervisor Engine 6T	15.3(1)SY

- C6800-48P-SFP and C6800-48P-SFP-XL OR C6800-48P-TX and C6800-48P-TX-XL are the orderable product IDs

- Cisco IOS software commands display C6800-48P-SFP or C6800-48P-SFP-XL for the SFP cards, and C6800-48P-TX or C6800-48P-TX-XL for the TX based cards.

- QoS Architecture

  - Receive:
    2q8t (for TX and SFP based cards)

  - Transmit:
    1p3q8t (for TX and SFP based cards)

- Number of ports: 48

- Forwarding and Performance: DFC4-A or DFC4-AXL daughter cards delivering performance up to a sustained 60 Mpps for L2, IPv4 and MPLS forwarding and 30 Mpps for IPv6 forwarding

- Upgrade to Release15.2(1)SY or later before installing these modules

- Backplane Connection: Connect to the switch fabric using dual full-duplex 20-Gbps switch fabric channels

- The TX models support copper RJ45 connectors 100 meters over Category 5, 5E, and 6. The SFP models support SX, LX/LH, -ZX, -T; 1000BASE-CWDM with the help of LC connecter

- Number of forwarding engines: 1

- Port Buffers (for both TX and SFP based cards)

  - Receive -173KB

  - Transmit -1.22MB

See this publication for more information:

http://www.cisco.com/c/en/us/products/collateral/switches/catalyst-6800-series-switches/datasheet-c78-733663.html

WS-X6848-TX-2T, WS-X6748-GE-TX

Product ID (append "=" for spares)	Product Description	Minimum Software Version
WS-X6848-TX-2TXL (has WS-F6K-DFC4-AXL) WS-X6848-TX-2T (has WS-F6K-DFC4-A) WS-X6748-GE-TX	48-port 10/100/1000 RJ-45	
	With Supervisor Engine 2T-10GE	15.0(1)SY
	With Supervisor Engine 6T	15.3(1)SY

- WS-X6748-GE-TX requires one of the following:

  - With Supervisor Engine 2T-10GE:

    - WS-F6K-DFC4-AXL

    - WS-F6K-DFC4-A

    - WS-F6700-CFC

- With Supervisor Engine 6T:
  - WS-F6K-DFC4-AXL
  - WS-F6K-DFC4-A
- QoS architecture: **2q8t/1p3q8t**
- Dual switch-fabric connections
  Fabric Channel #1: Ports 25–48
  Fabric Channel #2: Ports 1–24
- Number of ports: 48
  Number of port groups: 4
  Port ranges per port group: 1–12, 13–24, 25–36, 37–48
- On WS-X6848-TX-2T and WS-X6748-GE-TX ports, STP BPDUs are not exempt from Traffic Storm Control multicast suppression. Do not configure multicast suppression on STP-protected WS-X6848-TX-2T or WS-X6748-GE-TX ports that interconnect network devices.

WS-X6148E-GE-45AT

Product ID (append "=" for spares)	Product Description	Minimum Software Version
WS-X6148E-GE-45AT	48-port 10/100/1000 Mbps	
	With Supervisor Engine 2T-10GE	15.0(1)SY
	With Supervisor Engine 2T-10GE in VSS mode	15.1(1)SY

- RJ-45
- WS-X6148E-GE-45AT with WS-F6K-48-AT supports up to 48 ports of Class 4 PoE+ (30.0W).
- QoS port architecture (Rx/Tx): **1q2t/1p3q8t**
- Number of ports: 48
  Number of port groups: 6
  Port ranges per port group: 1–8, 9–16, 17–24, 25–32, 33–40, 41–48
- The aggregate bandwidth of each set of 8 ports (1–8, 9–16, 17–24, 25–32, 33–40, and 41–48) is 1 Gbps.
- Does not support traffic storm control

WS-X6148A-GE-TX

Product ID (append "=" for spares)	Product Description	Minimum Software Version
WS-X6148A-GE-TX	48-port 10/100/1000 Mbps	
	With Supervisor Engine 2T-10GE (not supported in VSS mode)	15.0(1)SY

- RJ-45

- WS-X6148A-GE-TX supports WS-F6K-GE48-AF or WS-F6K-48-AF

- With WS-F6K-GE48-AF, supports up to 45 ports of ePoE (16.8W).

- QoS port architecture (Rx/Tx): **1q2t/1p3q8t**

- Number of ports: 48
  Number of port groups: 6
  Port ranges per port group: 1–8, 9–16, 17–24, 25–32, 33–40, 41–48

- The aggregate bandwidth of each port group is 1 Gbps.

- Does not support traffic storm control.

Power over Ethernet Daughtercards

- WS-F6K-GE48-AF, WS-F6K-48-AF, page 28

WS-F6K-GE48-AF, WS-F6K-48-AF

Product ID (append "=" for spares)	Product Description	Minimum Software Versions
WS-F6K-GE48-AF **WS-F6K-48-AF**	IEEE 802.3af PoE daughtercard for: - WS-X6148A-GE-TX With Supervisor Engine 2T-10GE	15.0(1)SY

- WS-F6K-GE48-AF and WS-F6K-48-AF are not FRUs for these switching modules:

- WS-X6148A-GE-TX, supports up to 45 ports of ePoE (16.8W).

Transceivers

CFP Modules

Product ID (append "=" for spares)	Product Description	Minimum Software Version
CFP-40G-LR4	40GBASE-LR4	15.0(1)SY1
CFP-40G-SR4	40GBASE-SR4	15.0(1)SY1
CVR-CFP-4SFP10G	FourX coverter to convert each 40GE port into 4 10GE SFP+ ports	15.0(1)SY1

X2 Modules

Note

- WS-X6716-10G and WS-X6708-10GE do not support X2 modules that are labeled with a number that ends with -01. (This restriction does not apply to X2-10GB-LRM.)

- All X2 modules shipped since WS-X6716-10G became available provide EMI compliance with WS-X6816-10G and WS-X6716-10G.

- Some X2 modules shipped before WS-X6716-10G became available might not provide EMI compliance with WS-X6816-10G and WS-X6716-10G. See the information listed for each type of X2 module in the following table.

- For information about X2 modules, see the *Cisco 10GBASE X2 Modules* data sheet:

  http://www.cisco.com/c/en/us/products/collateral/interfaces-modules/10-gigabit-modules/product_data_sheet0900aecd801f92aa.html

Product ID (append "=" for spares)	Product Description		Minimum Software Version
CVR-X2-SFP10G	10G X2 to SFP+ Converter		15.0(1)SY
DWDM-X2-60.61=	10GBASE-DWDM 1560.61 nm X2 (100-GHz ITU grid)	ITU 21	15.0(1)SY
DWDM-X2-59.79=	10GBASE-DWDM 1559.79 nm X2 (100-GHz ITU grid)	ITU 22	15.0(1)SY
DWDM-X2-58.98=	10GBASE-DWDM 1558.98 nm X2 (100-GHz ITU grid)	ITU 23	15.0(1)SY
DWDM-X2-58.17=	10GBASE-DWDM 1558.17 nm X2 (100-GHz ITU grid)	ITU 24	15.0(1)SY
DWDM-X2-56.55=	10GBASE-DWDM 1556.55 nm X2 (100-GHz ITU grid)	ITU 26	15.0(1)SY
DWDM-X2-55.75=	10GBASE-DWDM 1555.75 nm X2 (100-GHz ITU grid)	ITU 27	15.0(1)SY
DWDM-X2-54.94=	10GBASE-DWDM 1554.94 nm X2 (100-GHz ITU grid)	ITU 28	15.0(1)SY
DWDM-X2-54.13=	10GBASE-DWDM 1554.13 nm X2 (100-GHz ITU grid)	ITU 29	15.0(1)SY
DWDM-X2-52.52=	10GBASE-DWDM 1552.52 nm X2 (100-GHz ITU grid)	ITU 31	15.0(1)SY
DWDM-X2-51.72=	10GBASE-DWDM 1551.72 nm X2 (100-GHz ITU grid)	ITU 32	15.0(1)SY
DWDM-X2-50.92=	10GBASE-DWDM 1550.92 nm X2 (100-GHz ITU grid)	ITU 33	15.0(1)SY
DWDM-X2-50.12=	10GBASE-DWDM 1550.12 nm X2 (100-GHz ITU grid)	ITU 34	15.0(1)SY

Product ID (append "=" for spares)	Product Description		Minimum Software Version
DWDM-X2-48.51=	10GBASE-DWDM 1548.51 nm X2 (100-GHz ITU grid)	ITU 36	15.0(1)SY
DWDM-X2-47.72=	10GBASE-DWDM 1547.72 nm X2 (100-GHz ITU grid)	ITU 37	15.0(1)SY
DWDM-X2-46.92=	10GBASE-DWDM 1546.92 nm X2 (100-GHz ITU grid)	ITU 38	15.0(1)SY
DWDM-X2-46.12=	10GBASE-DWDM 1546.12 nm X2 (100-GHz ITU grid)	ITU 39	15.0(1)SY
DWDM-X2-44.53=	10GBASE-DWDM 1544.53 nm X2 (100-GHz ITU grid)	ITU 41	15.0(1)SY
DWDM-X2-43.73=	10GBASE-DWDM 1543.73 nm X2 (100-GHz ITU grid)	ITU 42	15.0(1)SY
DWDM-X2-42.94=	10GBASE-DWDM 1542.94 nm X2 (100-GHz ITU grid)	ITU 43	15.0(1)SY
DWDM-X2-42.14=	10GBASE-DWDM 1542.14 nm X2 (100-GHz ITU grid)	ITU 44	15.0(1)SY
DWDM-X2-40.56=	10GBASE-DWDM 1540.56 nm X2 (100-GHz ITU grid)	ITU 46	15.0(1)SY
DWDM-X2-39.77=	10GBASE-DWDM 1539.77 nm X2 (100-GHz ITU grid)	ITU 47	15.0(1)SY
DWDM-X2-38.98=	10GBASE-DWDM 1538.98 nm X2 (100-GHz ITU grid)	ITU 48	15.0(1)SY
DWDM-X2-38.19=	10GBASE-DWDM 1538.19 nm X2 (100-GHz ITU grid)	ITU 49	15.0(1)SY
DWDM-X2-36.61=	10GBASE-DWDM 1536.61 nm X2 (100-GHz ITU grid)	ITU 51	15.0(1)SY
DWDM-X2-35.82=	10GBASE-DWDM 1535.82 nm X2 (100-GHz ITU grid)	ITU 52	15.0(1)SY
DWDM-X2-35.04=	10GBASE-DWDM 1535.04 nm X2 (100-GHz ITU grid)	ITU 53	15.0(1)SY
DWDM-X2-34.25=	10GBASE-DWDM 1534.25 nm X2 (100-GHz ITU grid)	ITU 54	15.0(1)SY
DWDM-X2-32.68=	10GBASE-DWDM 1532.68 nm X2 (100-GHz ITU grid)	ITU 56	15.0(1)SY
DWDM-X2-31.90=	10GBASE-DWDM 1531.90 nm X2 (100-GHz ITU grid)	ITU 57	15.0(1)SY
DWDM-X2-31.12=	10GBASE-DWDM 1531.12 nm X2 (100-GHz ITU grid)	ITU 58	15.0(1)SY
DWDM-X2-30.33=	10GBASE-DWDM 1530.33 nm X2 (100-GHz ITU grid)	ITU 59	15.0(1)SY
X2-10GB-T	10GBASE-T X2 Module for CAT6A/CAT7 copper cable		15.1(1)SY
X2-10GB-ZR	10GBASE-ZR X2 Module for SMF		15.0(1)SY
X2-10GB-CX4	10GBASE for CX4 (copper) cable		15.0(1)SY
X2-10GB-ER	10GBASE-ER Serial 1550-nm extended-reach, single-mode fiber (SMF), dispersion-shifted fiber (DSF) **Note** X2-10GB-ER modules labeled with a number that ends with -02 do not provide EMI compliance with WS-X6716-10G.		15.0(1)SY
X2-10GB-LR	10GBASE-LR Serial 1310-nm long-reach, single-mode fiber (SMF), dispersion-shifted fiber (DSF) **Note** X2-10GB-LR modules labeled with a number that ends with -02 or -03 do not provide EMI compliance with WS-X6716-10G.		15.0(1)SY
X2-10GB-LRM	10GBASE-LRM for FDDI-grade multimode fiber (MMF) **Note** Not supported by the **show idprom** command. (CSCsj35671)		15.0(1)SY

Product ID (append "=" for spares)	Product Description	Minimum Software Version
X2-10GB-LX4	10GBASE-LX4 Serial 1310-nm multimode (MMF) **Note** • See field notice 62840 for information about unsupported 10GBASE-LX4 modules: http://www.cisco.com/c/en/us/support/docs/field-notices/misc/FN62840.html • X2-10GB-LX4 modules labeled with a number that ends with -01 to -03 do not provide EMI compliance with WS-X6716-10G.	15.0(1)SY
X2-10GB-SR	10GBASE-SR Serial 850-nm short-reach multimode (MMF)	15.0(1)SY

10 GE SFP+ Modules

Product ID (append "" for spares)	Product Description	Minimum Software Version
DWDM-SFP10G-61.41	10GBASE-DWDM 1561.41 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-60.61	10GBASE-DWDM 1560.61 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-59.79	10GBASE-DWDM 1559.79 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-58.98	10GBASE-DWDM 1558.98 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-58.17	10GBASE-DWDM 1558.17 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-57.36	10GBASE-DWDM 1557.36 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-56.55	10GBASE-DWDM 1556.55 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-55.75	10GBASE-DWDM 1555.75 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-54.94	10GBASE-DWDM 1554.94 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-54.13	10GBASE-DWDM 1554.13 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-53.33	10GBASE-DWDM 1553.33 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-52.52	10GBASE-DWDM 1552.52 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-51.72	10GBASE-DWDM 1551.72 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-50.92	10GBASE-DWDM 1550.92 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-50.12	10GBASE-DWDM 1550.12 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-49.32	10GBASE-DWDM 1549.32 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-48.51	10GBASE-DWDM 1548.51 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-47.72	10GBASE-DWDM 1547.72 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-46.92	10GBASE-DWDM 1546.92 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-46.12	10GBASE-DWDM 1546.12 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-45.32	10GBASE-DWDM 1545.32 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-44.53	10GBASE-DWDM 1544.53 nm SFP+ (100-GHz ITU grid)	15.1(2)SY

Product ID (append "" for spares)	Product Description	Minimum Software Version
DWDM-SFP10G-43.73	10GBASE-DWDM 1543.73 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-42.94	10GBASE-DWDM 1542.94 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-42.14	10GBASE-DWDM 1542.14 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-41.35	10GBASE-DWDM 1541.35 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-40.56	10GBASE-DWDM 1540.56 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-39.77	10GBASE-DWDM 1539.77 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-38.98	10GBASE-DWDM 1538.98 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-38.19	10GBASE-DWDM 1538.19 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-37.40	10GBASE-DWDM 1537.40 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-36.61	10GBASE-DWDM 1536.61 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-35.82	10GBASE-DWDM 1535.82 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-35.04	10GBASE-DWDM 1535.04 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-34.25	10GBASE-DWDM 1534.25 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-33.47	10GBASE-DWDM 1533.47 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-32.68	10GBASE-DWDM 1532.68 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-31.90	10GBASE-DWDM 1531.90 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-31.12	10GBASE-DWDM 1531.12 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
DWDM-SFP10G-30.33	10GBASE-DWDM 1530.33 nm SFP+ (100-GHz ITU grid)	15.1(2)SY
CWDM-SFP10G-1530	**CWDM 1530-nm SFP+; 10 Gigabit Ethernet**	**15.3(1)SY**
SFP-10G-LR	**10GBASE-LR for 1310 nm SMF**	**15.0(1)SY1**
SFP-10G-ER	**10GBASE-ER for 1550 nm SMF**	**15.0(1)SY1**
SFP-10G-LRM	**10GBASE-LRM 1310 nm MMF and SMF**	**15.0(1)SY**
SFP-10G-SR	**10GBASE-SR 850 nm MMF**	**15.0(1)SY**
SFP-10G-ZR	**10GBASE-ZR SFP+ for 1550 nm SMF**	**15.1(2)SY3**
SFP-10G-LR-S	**10GBASE-LR for 1310 nm SMF, S-Class**	**15.2(1)SY**
SFP-10G-ER-S	**10GBASE-ER for 1550 nm SMF, S-Class**	**15.2(1)SY**
SFP-10G-SR-S	**10GBASE-SR 850 nm MMF, S-Class**	**15.2(1)SY**
SFP-10G-ZR-S	**10GBASE-ZR SFP+ for 1550 nm SMF, S-Class**	**15.2(1)SY**
SFP-10G-BX40D-I	**10GE for 1330 nm SMF**	**15.3(1)SY**
SFP-10G-BX40U-I	**10GE for 1270 nm SMF**	**15.3(1)SY**
SFP-H10GB-CU1M	**1m Twinax cable, passive, 30AWG cable assembly**	**15.2(1)SY**
SFP-H10GB-CU1-5M	**1.5m Twinax cable, passive, 30AWG cable assembly**	**15.2(1)SY**
SFP-H10GB-CU2M	**2m Twinax cable, passive, 30AWG cable assembly**	**15.2(1)SY**
SFP-H10GB-CU2-5M	**2.5m Twinax cable, passive, 30AWG cable assembly**	**15.2(1)SY**
SFP-H10GB-CU3M	**3m Twinax cable, passive, 30AWG cable assembly**	**15.2(1)SY**
SFP-H10GB-CU5M	**5m Twinax cable, passive, 24AWG cable assembly**	**15.2(1)SY**
SFP-H10GB-ACU7M	**7m Twinax cable, active, 30 AWG cable assembly**	**15.2(1)SY**

Product ID (append "" for spares)	Product Description	Minimum Software Version
SFP-H10GB-ACU10M	10m Twinax cable, active, 28 AWG cable assembly	15.2(1)SY
SFP-10G-AOC1M	1m Active Optical Cable assembly	15.2(1)SY
SFP-10G-AOC2M	2m Active Optical Cable assembly	15.2(1)SY
SFP-10G-AOC3M	3m Active Optical Cable assembly	15.2(1)SY
SFP-10G-AOC5M	5m Active Optical Cable assembly	15.2(1)SY
SFP-10G-AOC7M	7m Active Optical Cable assembly	15.2(1)SY
SFP-10G-AOC10M	10m Active Optical Cable assembly	15.2(1)SY

40 GE QSFP Modules

Product ID (append "" for spares)	Product Description	Minimum Software Version
QSFP-40G-SR4	40GBASE-SR4, 4 lanes, 850 nm MMF	15.2(2)SY
QSFP-40G-CSR4	40GBASE-CSR4, 4 lanes, 850 nm MMF	15.2(2)SY
QSFP-40G-LR4	40GBASE-LR4, 1310 nm, SMF with OTU3 data-rate support	15.2(2)SY
QSFP-40G-ER4	40GBASE-ER4, 1310 nm, SMF with OTU3 data-rate support	15.2(2)SY
QSFP-40G-SR-BD	40GBASE-SR-BiDi, duplex MMF	15.2(2)SY
QSFP-40G-SR4-S	40GBASE-SR4, 4 lanes, 850 nm MMF, S-Class	15.3(1)SY1
QSFP-40G-LR4-S	40GBASE-LR4, 1310 nm, SMF, S-Class	15.3(1)SY1
WSP-Q40GLR4L	40GBASE-LR4-Lite, 1310 nm, SMF	15.3(1)SY1
QSFP-H40G-CU1M	1m QSFP to QSFP passive copper direct-attach cables	15.2(2)SY
QSFP-H40G-CU3M	3m QSFP to QSFP passive copper direct-attach cables	15.2(2)SY
QSFP-H40G-CU5M	5m QSFP to QSFP passive copper direct-attach cables	15.2(2)SY
QSFP-H40G-ACU7M	7m QSFP to QSFP active copper direct-attach cables	15.2(2)SY
QSFP-H40G-ACU10M	10m QSFP to QSFP active copper direct-attach cables	15.2(2)SY
QSFP-H40G-AOC1M	1m QSFP to QSFP active optical cables	15.3(1)SY
QSFP-H40G-AOC2M	2m QSFP to QSFP active optical cables	15.3(1)SY
QSFP-H40G-AOC3M	3m QSFP to QSFP active optical cables	15.3(1)SY
QSFP-H40G-AOC5M	5m QSFP to QSFP active optical cables	15.3(1)SY
QSFP-H40G-AOC7M	7m QSFP to QSFP active optical cables	15.3(1)SY
QSFP-H40G-AOC10M	10m QSFP to QSFP active optical cables	15.3(1)SY
QSFP-H40G-AOC15M	15m QSFP to QSFP active optical cables	15.3(1)SY
QSFP-4SFP10G-CU1M	1m QSFP to 4 SFP+ passive copper break-out cables	15.3(1)SY
QSFP-4SFP10G-CU3M	3m QSFP to 4 SFP+ passive copper break-out cables	15.3(1)SY
QSFP-4SFP10G-CU5M	5m QSFP to 4 SFP+ passive copper break-out cables	15.3(1)SY
QSFP-4X10G-AC7M	7m QSFP to 4 SFP+ passive copper break-out cables	15.3(1)SY
QSFP-4X10G-AC10M	10m QSFP to 4 SFP+ passive copper break-out cables	15.3(1)SY

■ **Supported Hardware**

Product ID (append "" for spares)	Product Description	Minimum Software Version
QSFP-4X10G-AOC1M	1m QSFP to four SFP+ active optical breakout cables	15.3(1)SY
QSFP-4X10G-AOC2M	2m QSFP to four SFP+ active optical breakout cables	15.3(1)SY
QSFP-4X10G-AOC3M	3m QSFP to four SFP+ active optical breakout cables	15.3(1)SY
QSFP-4X10G-AOC5M	5m QSFP to four SFP+ active optical breakout cables	15.3(1)SY
QSFP-4X10G-AOC7M	7m QSFP to four SFP+ active optical breakout cables	15.3(1)SY
QSFP-4X10G-AOC10M	10m QSFP to four SFP+ active optical breakout cables	15.3(1)SY
CVR-4SFP10G-QSFP	4 x SFP10G to QSFP Reverse Adapter	15.3(1)SY

XENPAKs

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>
> **Note** • For information about DWDM XENPAKs, see the *Cisco 10GBase DWDM XENPAK Modules* data sheet:
>
>   http://www.cisco.com/c/en/us/products/collateral/interfaces-modules/dwdm-transceiver-modules/product_data_sheet0900aecd801f9333.html

Product ID (append "=" for spares)	Product Description	Minimum Software Version
XENPAK-10GB-LRM	10GBASE-LRM XENPAK Module for MMF **Note** Not supported by the **show idprom** command. (CSCsl21260)	15.0(1)SY
DWDM-XENPAK	10GBASE dense wavelength-division multiplexing (DWDM) 100-GHz ITU grid	15.0(1)SY
WDM-XENPAK-REC	10GBASE receive-only wavelength division multiplexing (WDM)	15.0(1)SY
XENPAK-10GB-CX4	10GBASE for CX4 (copper) cable; uses Infiniband connectors	15.0(1)SY
XENPAK-10GB-ER	10GBASE-ER Serial 1550-nm extended-reach, single-mode fiber (SMF), dispersion-shifted fiber (DSF) **Note** XENPAK-10GB-ER units with Part No. 800-24557-01 are not supported, as described in this external field notice (CSCee47030): http://www.cisco.com/c/en/us/support/docs/field-notices/200/fn29736.html	15.0(1)SY
XENPAK-10GB-ER+	10GBASE-ER Serial 1550-nm extended-reach, single-mode fiber (SMF), dispersion-shifted fiber (DSF)	15.0(1)SY
XENPAK-10GB-LR	10GBASE-LR Serial 1310-nm long-reach, single-mode fiber (SMF), dispersion-shifted fiber (DSF)	15.0(1)SY
XENPAK-10GB-LR+	10GBASE-LR Serial 1310-nm long-reach, single-mode fiber (SMF), dispersion-shifted fiber (DSF)	15.0(1)SY

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Product ID (append "=" for spares)	Product Description	Minimum Software Version
XENPAK-10GB-LW	10GBASE-LW XENPAK Module with WAN PHY for SMF **Note** XENPAK-10GB-LW operates at an interface speed compatible with SONET/SDH OC-192/STM-64. XENPAK-10GB-LW links might go up and down if the data rate exceeds 9Gbs. (CSCsi58211)	15.0(1)SY
XENPAK-10GB-LX4	10GBASE-LX4 Serial 1310-nm multimode (MMF)	15.0(1)SY
XENPAK-10GB-SR	10GBASE-SR Serial 850-nm short-reach multimode (MMF)	15.0(1)SY
XENPAK-10GB-ZR	10GBASE for any SMF type	15.0(1)SY

Small Form-Factor Pluggable (SFP) Modules

- Gigabit Ethernet SFPs, page 35
- Fast Ethernet SFPs, page 37

Gigabit Ethernet SFPs

Note
- For information about coarse wavelength-division multiplexing (CWDM) SFPs, see the *Cisco CWDM GBIC and SFP Solutions* data sheet:

  http://www.cisco.com/c/en/us/products/collateral/interfaces-modules/cwdm-transceiver-modules/product_data_sheet09186a00801a557c.html

- For information about DWDM SFPs, see the *Cisco CWDM GBIC and SFP Solutions* data sheet:

  http://www.cisco.com/c/en/us/products/collateral/interfaces-modules/dwdm-transceiver-modules/product_data_sheet0900aecd80582763.html

- See the "Unsupported Hardware" section on page 46 for information about unsupported DWDM-SFPs.

- For information about other SFPs, see the *Cisco SFP Optics For Gigabit Ethernet Applications* data sheet:

  http://www.cisco.com/c/en/us/products/collateral/interfaces-modules/gigabit-ethernet-gbic-sfp-modules/product_data_sheet0900aecd8033f885.html

Product ID (append "=" for spares)	Product Description	Minimum Software Version
GLC-EX-SMD &	1000BASE-EX SFP transceiver module for SMF, 1310-nm wavelength, extended operating temperature range and DOM support, dual LC/PC connector	15.2(1)SY
GLC-BX-D	1000BASE-BX10 SFP module for single-strand SMF, 1490-nm TX/1310-nm RX wavelength	15.0(1)SY
GLC-BX-U	1000BASE-BX10 SFP module for single-strand SMF, 1310-nm TX/1490-nm RX wavelength	15.0(1)SY

Product ID (append "=" for spares)	Product Description	Minimum Software Version
GLC-LH-SMD GLC-LH-SM	1000BASE-LX/LH SFP **Note** Supported with WS-X6904-40G-2T in Release 15.1(1)SY1 and later releases.	15.0(1)SY
GLC-SX-MMD GLC-SX-MM	1000BASE-SX SFP **Note** Supported with WS-X6904-40G-2T in Release 15.1(1)SY1 and later releases.	15.0(1)SY
GLC-T	1000BASE-T 10/100/1000 SFP module **Note** • For WS-X6904-40G-2T LC, supported only at 1000 Mbps. • Supported with WS-X6904-40G-2T in Release 15.1(1)SY1 and later releases.	15.0(1)SY
GLC-ZX-SM GLC-ZX-SMD	1000BASE-ZX SFP module 1000BASE-ZX SFP transceiver module for SMF, 1550-nm wavelength, dual LC/PC connector	15.0(1)SY
CWDM-SFP-1470	CWDM 1470-nm (Gray) Gigabit Ethernet, 1 and 2 Gb Fibre Channel SFP module	15.0(1)SY
CWDM-SFP-1490	CWDM 1490-nm (Violet) Gigabit Ethernet, 1 and 2 Gb Fibre Channel SFP module	15.0(1)SY
CWDM-SFP-1510	CWDM 1510-nm (Blue) Gigabit Ethernet, 1 and 2 Gb Fibre Channel SFP module	15.0(1)SY
CWDM-SFP-1530	CWDM 1530-nm (Green) Gigabit Ethernet, 1 and 2 Gb Fibre Channel SFP module	15.0(1)SY
CWDM-SFP-1550	CWDM 1550-nm (Yellow) Gigabit Ethernet, 1 and 2 Gb Fibre Channel SFP module	15.0(1)SY
CWDM-SFP-1570	CWDM 1570-nm (Orange) Gigabit Ethernet, 1 and 2 Gb Fibre Channel SFP module	15.0(1)SY
CWDM-SFP-1590	CWDM 1590-nm (Red) Gigabit Ethernet, 1 and 2 Gb Fibre Channel SFP module	15.0(1)SY
CWDM-SFP-1610	CWDM 1610-nm (Brown) Gigabit Ethernet, 1 and 2 Gb Fibre Channel SFP module	15.0(1)SY
DWDM-SFP-5817	1000BASE-DWDM 1558.17 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-5252	1000BASE-DWDM 1552.52 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-5172	1000BASE-DWDM 1551.72 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-5012	1000BASE-DWDM 1550.12 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-4692	1000BASE-DWDM 1546.92 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-4373	1000BASE-DWDM 1543.73 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-4214	1000BASE-DWDM 1542.14 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-3977	1000BASE-DWDM 1539.77 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-3898	1000BASE-DWDM 1538.98 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-3582	1000BASE-DWDM 1535.82 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-3504	1000BASE-DWDM 1535.04 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-6061	1000BASE-DWDM 1560.61 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-5979	1000BASE-DWDM 1559.79 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-5898	1000BASE-DWDM 1558.98 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-5655	1000BASE-DWDM 1556.55 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-5575	1000BASE-DWDM 1555.75 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-5494	1000BASE-DWDM 1554.94 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY

Product ID (append "=" for spares)	Product Description	Minimum Software Version
DWDM-SFP-5413	1000BASE-DWDM 1554.13 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-5092	1000BASE-DWDM 1550.92 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-4851	1000BASE-DWDM 1548.51 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-4772	1000BASE-DWDM 1547.72 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-4612	1000BASE-DWDM 1546.12 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-4453	1000BASE-DWDM 1544.53 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-4294	1000BASE-DWDM 1542.94 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-4056	1000BASE-DWDM 1540.56 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-3819	1000BASE-DWDM 1538.19 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-3661	1000BASE-DWDM 1536.61 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-3425	1000BASE-DWDM 1534.25 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-3268	1000BASE-DWDM 1532.68 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-3190	1000BASE-DWDM 1531.90 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-3112	1000BASE-DWDM 1531.12 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY
DWDM-SFP-3033	1000BASE-DWDM 1530.33 nm SFP (100-GHz ITU grid) SFP module	15.0(1)SY

Fast Ethernet SFPs

Note • For information about Fast Ethernet SFPs, see the *Cisco 100BASE-X SFP For Fast Ethernet SFP Ports* data sheet:
http://www.cisco.com/c/en/us/products/collateral/interfaces-modules/fast-ethernet-sfp-modules/product_data_sheet0900aecd801f931c.html

Product ID (append "=" for spares)	Product Description	Minimum Software Version
GLC-FE-100BX-U	100BASE-BX10-U SFP	15.0(1)SY
GLC-FE-100BX-D	100BASE-BX10-D SFP	
GLC-FE-100EX	100BASEEX SFP	
GLC-FE-100ZX	100BASEZX SFP	
GLC-FE-100FX	100BASEFX SFP	
GLC-FE-100LX	100BASELX SFP	
GLC-GE-100FX	100BASEEX SFP	

Gigabit Interface Converters (GBICs)

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Note The support listed in this section applies to all modules that use GBICs.

Product ID (append "=" for spares)	Product Description	Minimum Software Versions
WDM-GBIC-REC	Receive-only wavelength division multiplexing (WDM) GBIC	15.0(1)SY
DWDM-GBIC	Dense wavelength division multiplexing (DWDM) GBIC	15.0(1)SY
CWDM-GBIC-1470	Cisco 1000BASE-CWDM GBIC, 1470 nm (Gray)	15.0(1)SY
CWDM-GBIC-1490	Cisco 1000BASE-CWDM GBIC, 1490 nm (Violet)	15.0(1)SY
CWDM-GBIC-1510	Cisco 1000BASE-CWDM GBIC, 1510 nm (Blue)	15.0(1)SY
CWDM-GBIC-1530	Cisco 1000BASE-CWDM GBIC, 1530 nm (Green)	15.0(1)SY
CWDM-GBIC-1550	Cisco 1000BASE-CWDM GBIC, 1550 nm (Yellow)	15.0(1)SY
CWDM-GBIC-1570	Cisco 1000BASE-CWDM GBIC, 1570 nm (Orange)	15.0(1)SY
CWDM-GBIC-1590	Cisco 1000BASE-CWDM GBIC, 1590 nm (Red)	15.0(1)SY
CWDM-GBIC-1610	Cisco 1000BASE-CWDM GBIC, 1610 nm (Brown)	15.0(1)SY
WS-G5483	1000BASET GBIC	15.0(1)SY
WS-G5484	Short wavelength, 1000BASE-SX	15.0(1)SY
WS-G5486	Long wavelength/long haul, 1000BASE-LX/LH	15.0(1)SY
WS-G5487	Extended distance, 1000BASE-ZX	15.0(1)SY

Service Modules

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Note
- For service modules that run their own software, see the service module software release notes for information about the minimum required service module software version.

- With SPAN configured to include a port-channel interface to support a service module, be aware of CSCth03423 and CSCsx46323.

- EtherChannel configuration can impact some service modules. In particular, distributed EtherChannels (DECs) can interfere with service module traffic. See this field notice for more information:

  http://www.cisco.com/c/en/us/support/docs/field-notices/610/fn61935.html

Application Control Engine (ACE) Module

Product ID (append "=" for spares)	Product Description	Minimum Software Versions
ACE30-MOD-K9	Application Control Engine (ACE) module	
	With Supervisor Engine 2T-10GE	15.0(1)SY

- ACE modules run their own software—See these publications:

  http://www.cisco.com/c/en/us/support/interfaces-modules/ace-application-control-engine-module/tsd-products-support-model-home.html

  See the ACE module software release notes for information about the minimum required service module software version.

ASA Services Module

Product ID (append "=" for spares)	Product Description	Minimum Software Versions
WS-SVC-ASA-SM1-K7	ASA Services Module	
	With Supervisor Engine 2T-10GE	15.1(1)SY3
WS-SVC-ASA-SM1-K9	ASA Services Module	
	With Supervisor Engine 2T-10GE	15.0(1)SY1

- Upgrade to the minimum software version or later before installing an ASA services module (see the "EFSU Compatibility" section on page 48).

- ASA modules run their own software—See these publications:

  http://www.cisco.com/c/en/us/support/interfaces-modules/catalyst-6500-series-7600-series-asa-services-module/tsd-products-support-model-home.html

  See the module software release notes for information about the minimum required service module software version.

Network Analysis Modules (NAMs)

Product ID (append "=" for spares)	Product Description	Minimum Software Version
WS-SVC-NAM3-6G-K9	Network Analysis Module 3	
	With Supervisor Engine 2T-10GE	15.0(1)SY1

- Upgrade to Release 15.0(1)SY1 or later before installing WS-SVC-NAM3-6G-K9 (see the "EFSU Compatibility" section on page 48).

- NAM modules run their own software—See these publications for more information:

    – http://www.cisco.com/c/en/us/support/cloud-systems-management/prime-network-analysis-module -software/products-release-notes-list.html

    – http://www.cisco.com/c/en/us/support/cloud-systems-management/prime-network-analysis-module -software/tsd-products-support-series-home.html

    See the software release notes for information about the minimum required NAM software version.

Wireless Services Modules (WiSMs)

Product ID (append "=" for spares)	Product Description	Minimum Software Versions
WS-SVC-WISM2-1-K9 **WS-SVC-WISM2-3-K9** **WS-SVC-WISM2-5-K9**	Wireless Services Module 2 (WiSM2)	
	With Supervisor Engine 2T-10GE	15.0(1)SY

Wireless services modules run their own software—See these publications:

http://www.cisco.com/c/en/us/support/interfaces-modules/services-modules/products-release-notes-list.html

See the wireless services modules software release notes for information about the minimum required wireless services module software version.

Power Supplies

- WS-C6503-E Power Supplies, page 41

- WS-C6504-E Power Supplies, page 41

- All Other Power Supplies, page 41

WS-C6503-E Power Supplies

Product ID (append "=" for spares)	Product Description	Minimum Software Version
PWR-1400-AC	1,400 W AC power supply	15.0(1)SY
PWR-950-DC	950 W DC power supply	15.0(1)SY

WS-C6504-E Power Supplies

Product ID (append "=" for spares)	Product Description	Minimum Software Version
PWR-2700-AC/4	2700 W AC power supply	15.0(1)SY
PWR-2700-DC/4	2700 W DC power supply	15.0(1)SY

All Other Power Supplies

Note The power supplies in this section are not supported in these chassis:

- Catalyst 6503-E
- Catalyst 6504-E

Product ID (append "=" for spares)	Product Description	Minimum Software Version
WS-CAC-8700W-E	8,700 W AC power supply	15.0(1)SY
	Note	
	• WS-CAC-8700W-E supports a remote power cycling feature.	
	• See this publication for more information:	
	http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst6500/hardware/Chassis_Installation/Cat6500/6500_ins.html	
PWR-6000-DC	6,000 W DC power supply	15.0(1)SY
WS-CAC-6000W	6,000 W AC power supply	
PWR-4000-DC	4,000 W DC power supply	
WS-CAC-4000W	4,000 W AC power supply	
+WS-CAC-3000W	3,000 W AC power supply	
WS-CAC-3000W	3,000 W AC power supply	
WS-CDC-2500W	2,500 W DC power supply	

Chassis

Note Chassis with 64 MAC addresses automatically enable the Extended System ID feature, which is enabled with the spanning-tree extend system-id command. You cannot disable the extended-system ID in chassis that support 64 MAC addresses. The Extended System ID feature might already be enabled in your network, because it is required to support both extended-range VLANs and any chassis with 64 MAC addresses. **Enabling the extended system ID feature for the first time updates the bridge IDs of all active STP instances, which might change the spanning tree topology.**

13-Slot Chassis

Note With Supervisor Engine 2T-10GE, the slot reserved for a redundant supervisor engine can be populated with one of these modules:

- WS-X6148E-GE-45AT

- WS-X6148A-GE-TX

Product ID (append "=" for spare)	Product Description	Minimum Software Version
WS-C6513-E	• 13 slots • Slot 7 and slot 8 are reserved for supervisor engines • 64 chassis MAC addresses	
	With Supervisor Engine 2T-10GE	15.1(1)SY
	With Supervisor Engine 6T	15.3(1)SY2

9-Slot Chassis

Product ID (append "=" for spare)	Product Description	Minimum Software Version

WS-C6509-V-E	• 9 vertical slots
	• 64 chassis MAC addresses
	• Required power supply:
	  – 2,500 W DC or higher
	  – 3,000 W AC or higher	

	With Supervisor Engine 2T-10GE	15.0(1)SY
	With Supervisor Engine 6T	15.3(1)SY2

Product ID (append "=" for spare)	Product Description	Minimum Software Version

WS-C6509-E	• 9 horizontal slots
	
	• Chassis MAC addresses:
	  – Before April 2009—1024 chassis MAC addresses
	  – Starting in April 2009—64 chassis MAC addresses
	
	Note Chassis with 64 MAC addresses automatically enable the Extended System ID feature, which is enabled with the spanning-tree extend system-id command. You cannot disable the extended-system ID in chassis that support 64 MAC addresses. The Extended System ID feature might already be enabled in your network, because it is required to support both extended-range VLANs and any chassis with 64 MAC addresses. **Enabling the extended system ID feature for the first time updates the bridge IDs of all active STP instances, which might change the spanning tree topology.**
	
	• Requires 2,500 W or higher power supply	

	With Supervisor Engine 2T-10GE	15.0(1)SY
	With Supervisor Engine 6T	15.3(1)SY1

7-Slot Chassis

Product ID (append "=" for spare)	Product Description	Minimum Software Version
Catalyst 6807-XL	• 7 slots • Required power supply: – 3,000 W AC (C6800-XL-3KW-AC)	
	With Supervisor Engine 2T-10GE	15.2(1)SY
	With Supervisor Engine 6T	15.3(1)SY

6-Slot Chassis

Product ID (append "=" for spare)	Product Description	Minimum Software Version

WS-C6506-E	• 6 slots
	
	• Chassis MAC addresses:
	
	  – Before April 2009—1024 chassis MAC addresses
	
	  – Starting in April 2009—64 chassis MAC addresses
	
	Note Chassis with 64 MAC addresses automatically enable the Extended System ID feature, which is enabled with the spanning-tree extend system-id command. You cannot disable the extended-system ID in chassis that support 64 MAC addresses. The Extended System ID feature might already be enabled in your network, because it is required to support both extended-range VLANs and any chassis with 64 MAC addresses. **Enabling the extended system ID feature for the first time updates the bridge IDs of all active STP instances, which might change the spanning tree topology.**
	
	• Requires 2,500 W or higher power supply	

	With Supervisor Engine 2T-10GE	15.0(1)SY
	With Supervisor Engine 6T	15.3(1)SY1

4-Slot Chassis

Product ID (append "=" for spare)	Product Description	Minimum Software Version
WS-C6504-E	• 4 slots • 64 chassis MAC addresses	
	With Supervisor Engine 2T-10GE	15.0(1)SY
	With Supervisor Engine 6T	15.3(1)SY1

3-Slot Chassis

Product ID (append "=" for spare)	Product Description	Minimum Software Version
WS-C6503-E	• 3 slots • 64 chassis MAC addresses • WS-X6904-40G-2T and WS-X6908-10GE are supported only with WS-C6503-E hardware revision 1.3 or higher.	
	With Supervisor Engine 2T-10GE	15.0(1)SY
	With Supervisor Engine 6T	15.3(1)SY2

Unsupported Hardware

Release 15.2(1)SY supports only the hardware listed in the "Supported Hardware" section on page 2. Unsupported modules remain powered down if detected and do not affect system behavior.

Release 15.2(1)SY does not support these modules:

- Supervisor Engine 720-10GE and Supervisor Engine 720
- WS-SVC-FWM-1-K9
- WS-SVC-IDS2-BUN-K9
- WS-SVC-NAM-1
- WS-SVC-NAM-2
- WS-SVC-NAM-1-250S
- WS-SVC-NAM-2-250S
- WS-X6548-RJ-45
- WS-X6548-RJ-21
- WS-X6348-RJ45V
- WS-X6348-RJ-45
- WS-X6348-RJ21V
- WS-X6196-RJ-21
- WS-X6196-21AF
- WS-X6148X2-RJ-45
- WS-X6148X2-45AF
- WS-X6148-RJ45V
- WS-X6148-RJ-45
- WS-X6148-RJ21V
- WS-X6148-RJ-21
- WS-X6148A-RJ-45

- WS-X6148A-45AF
- WS-X6148-45AF
- WS-X6148-21AF
- WS-X6524-100FX-MM
- WS-X6324-100FX-MM
- WS-X6148-FE-SFP
- WS-X6548V-GE-TX
- WS-X6548-GE-TX
- WS-X6548-GE-45AF
- WS-X6516-GE-TX
- WS-X6148V-GE-TX
- WS-X6148A-GE-45AF
- WS-X6148-GE-TX
- WS-X6148-GE-45AF
- WS-X6816-GBIC
- WS-X6516-GBIC
- WS-X6516A-GBIC
- WS-X6416-GBIC
- WS-X6408-GBIC
- WS-X6408A-GBIC
- WS-X6502-10GE
- WS-F6K-DFC3A
- WS-F6K-DFC3B
- WS-F6K-DFC3BXL
- WS-CAC-2500W
- PWR-950-AC
- WS-C6513

Images and Feature Sets

Use Cisco Feature Navigator to display information about the images and feature sets in Release 15.4SY.

The releases includes strong encryption images. Strong encryption images are subject to U.S. and local country export, import, and use laws. The country and class of end users eligible to receive and use Cisco encryption solutions are limited. See this publication for more information:

http://www.cisco.com/web/about/doing_business/legal/global_export_trade/general_export/contract_compliance.html

EFSU Compatibility

SX SY EFSU Compatibility Matrix (XLSX - Opens with Microsoft Excel)

Cisco IOS Behavior Changes

Behavior changes describe the minor modifications that are sometimes introduced in a software release. When behavior changes are introduced, existing documentation is updated.

- CSCuc08159 - SSH support X509-V3 Certificate
- CSCtg63890 - IOS-XE BGP Support for multiple sourced paths for sourced routes
- CSCuq27549 - First data packet not encapsulated in MSDP SA message when RP is the FHR
- CSCth11646 - MPLS MTU not configurable on GRE tunnel interfaces
- CSCus67763 - Disable snmp on wccp GRE Tunnels
- CSCus78750 - 6RD: Knob to disable security check missing.
- CSCus79383 - IOS BGP support for BFD dampening
- CSCty33893 - LSM: on Adding a LSP path,for jumbo frames traffic punted to software
- CSCuz87803 - IPv6 nd packet processing behavior(PI changes,CSCva39982 for PD changes)
- CSCuz67187 - Stdby reload due to conf sync failure after changing src template config
- CSCva39982 - IPv6 neighbor discovery packet processing behavior
- CSCuz77592 - Add IPv4 RIB support for secondary next hops
- CSCva39982 - IPv6 neighbor discovery packet processing behavior
- CSCva76550 - Deprecate pnp transport xmpp CLI
- CSCva85178 - mtrose: WARNING msg to display on PIM dense mode configuration
- CSCva90092 - DNA-SA:UDP src port display CLI support with different tuple combination
- CSCvb01532 - Cisco SD-Access : SGT caching for Vxlan encap packet going to CPU
- CSCvb46909 - Lack of show pnp tech auto-save support during day-0 deployment time
- CSCuz94722 - MACSEC link not encrypting traffic in half duplex
- CSCvb40269 - DHCP Relay duplicates packets
- CSCvb64727 - "no ntp allow mode control" does not seem to be working
- CSCvc33171 - Cisco IOS and IOS XE Software Plug-and-Play PKI API Certificate Validation Vulnerability
- CSCvc78694 - Ikev2 SA INIT queue CLI : Fix default behaviour
- CSCvd36810 - Smart Install client must alert to console periodically

New Features in Release 15.4(1)SY4

These sections describe the new features in Release 15.4(1)SY4, 26 February 2018:

- New Hardware Features in Release 15.4(1)SY4, page 49
- New Software Features in Release 15.4(1)SY4, page 49

New Hardware Features in Release 15.4(1)SY4

None.

New Software Features in Release 15.4(1)SY4

None.

New Features in Release 15.4(1)SY3

These sections describe the new features in Release 15.4(1)SY3, 02 November 2017:

- New Hardware Features in Release 15.4(1)SY3, page 49
- New Software Features in Release 15.4(1)SY3, page 49

New Hardware Features in Release 15.4(1)SY3

None.

New Software Features in Release 15.4(1)SY3

None.

New Features in Release 15.4(1)SY2

These sections describe the new features in Release 15.4(1)SY2, 02 June 2017:

- New Hardware Features in Release 15.4(1)SY2, page 49
- New Software Features in Release 15.4(1)SY2, page 49

New Hardware Features in Release 15.4(1)SY2

None.

New Software Features in Release 15.4(1)SY2

- Campus Fabric enhancements:
  - Campus Fabric licensing

> – DHCP solution
>
> – IPv6 multicast HE replication
>
> – Path Trace support
>
> – IPv6 layer3 without mobility

New Features in Release 15.4(1)SY1

These sections describe the new features in Release 15.4(1)SY1, 12 December 2016:

New Hardware Features in Release 15.4(1)SY1

- Cisco Catalyst 6880-X Series Extensible Fixed Aggregation Switches
- Cisco Catalyst 6840-X Series Fixed Aggregation Switches
- Following transceiver and breakout cable support is introduced on Cisco Catalyst 6840-X Series Fixed Aggregation Switches:
  - CWDM-SFP10G-1530
  - QSFP-4X10G-AOC1M
  - QSFP-4X10G-AOC2M
  - QSFP-4X10G-AOC3M
  - QSFP-4X10G-AOC5M
  - QSFP-4X10G-AOC7M
  - QSFP-4X10G-AOC10M

New Software Features in Release 15.4(1)SY1

- IPv6 OGACL
- MLD Snooping over VPLS
- Campus Fabric support on Cisco Catalyst 6880-X Series Extensible Fixed Aggregation Switches and Cisco Catalyst 6840-X Series Fixed Aggregation Switches and C6800-SUP6T supervisor uplink.

New Features in Release 15.4(1)SY

These sections describe the new features in Release 15.4(1)SY, 06 September 2016:

New Hardware Features in Release 15.4(1)SY

- CVR-4SFP10G-QSFP

Note Support is introduced for C6800-8P10G/XL, C6800-16P10G/XL and, C6800-32P10G/XL linecards inserted in a SUP2T system.

New Software Features in Release 15.4(1)SY

- Campus Fabric:
  Supervisor Engine 6T
  http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst6500/ios/15-4SY/config_guide/sup6T/15_3_sy_swcg_6T.html
  Supervisor Engine 2T-10GE
  http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst6500/ios/15-4SY/config_guide/sup2T/15_4_sy_swcg_2T.html
- Korea Homologation:
  - Support for SHA-25 Authentication
    http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/sec_usr_cfg/configuration/15-sy/sec-usr-cfg-15-sy-book/sec-image-verifctn.html
  - Logging Buffer Size
    http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/config-mgmt/configuration/15-sy/config-mgmt-15-sy-book/cm-config-logger-per.html
  - Blocking Repeated Failed Logins
    http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/sec_usr_cfg/configuration/15-sy/sec-usr-cfg-15-sy-book/sec-cfg-sec-4cli.html
  - HTTPS Support
    http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/https/config/https-15-sy-book.html
- BFD Hardware Offload:
  - Feature understanding
    Bidirectional Forwarding Detection (BFD) offload support provides the functionality to offload a BFD session to the hardware. BFD is a forwarding path failure detection protocol and reduces the overall network convergence time by sending rapid failure detection packets (messages) to the routing protocols for recalculating the routing table. Previously the performance of BFD was restricted to the capabilities of CPU and IOS on the switch. Effective failure detection requires BFD to run at high frequencies (using aggressive timers as low as 50ms), which was not possible because of CPU and IOS restrictions.
  - Restrictions for BFD Hardware Offload Support
  - Only BFD version 1 is supported.
  - Only FPGA offloaded BFD sessions are supported on Cisco C6800-SUP6T-XL
  - The switch supports BFD only in Asynchronous mode or no echo mode.
  - The switch supports max 128 asynchronous BFD sessions.
  - BFD hardware offload is supported on port-channel interfaces, SVI and routed interface
  - BFD hardware offload is not supported for BFD with TE/FRR, GRE
  - BFD hardware offload is not supported for BFD Multi-Hop

- • If the no echo command is executed when the session is up, use the shut/no shut command to offload BFD in hardware.
  - – Information About BFD
- • BFD Hardware Offload is supported for both IPv4 and IPv6 Session
- • BFD Hardware Offload is supported for Static routes, OSPFv2,OSPFv3, ISIS, EIGRP and BGP
  - – Configuring BFD Hardware Offload Support
    By default the Cisco IOS runs in echo mode. Hence, BFD is not offloaded to the hardware until the no bfd echo command is executed. The no bfd echo command changes the mode from "echo" to "Asynchronous".

```
interface GigabitEthernet0/9
 no switchport
 ip address 10.1.1.6 255.255.255.0
 bfd interval 50 min_rx 50 multiplier 3
 no bfd echo
Switch(config)#platform offload bfd enable-offload
```

- • Verifying BFD Hardware Offload Support
  Ensure that the Session host value displays "Hardware". Use the show bfd neighbors detail to verify the configuration of BFD Hardware Offload.

```
Sup6T-HA-1#sho bfd neighbors details
IPv4 Sessions
NeighAddr                          LD/RD       RH/RS      State      Int
172.16.3.99                        20/85       Up         Up         Vl500
Session state is UP and not using echo function.
Session Host: Hardware
OurAddr: 172.16.3.100
Handle: 22
Local Diag: 0, Demand mode: 0, Poll bit: 0
MinTxInt: 500000, MinRxInt: 500000, Multiplier: 3
Received MinRxInt: 500000, Received Multiplier: 3
Holddown (hits): 0(0), Hello (hits): 500(0)
Rx Count: 20228
Tx Count: 20977
Elapsed time watermarks: 0 0 (last: 0)
Registered protocols: HSRP CEF OSPFv3
Uptime: 03:03:15
Last packet: Version: 1              - Diagnostic: 0
             State bit: Up           - Demand bit: 0
             Poll bit: 0             - Final bit: 0
             C bit: 1
             Multiplier: 3           - Length: 24
             My Discr.: 85           - Your Discr.: 20
             Min tx interval: 500000 - Min rx interval: 500000
             Min Echo interval: 0
```

- • Identify multiple IA Client Modules by Beacon LED:
  Use the below CLI to enable blue beacon LED for a range of IA clients and slots.

```
Router(config)#hw-module fex range ?
    WORD  FEX id's <101-512> Eg. 101-110
Router(config)#hw-module fex range 101-102 slot ?
    WORD  FEX module slot number <1-5> Eg. 1-3,5 e.g.
Router(config)#hw-module fex range 101-102 slot 1-2 led beacon
C6K FEX BLUE BEACON CONFIG
----------------------------------------------
hw-module fex 101 slot 1 led beacon
hw-module fex 101 slot 2 led beacon
hw-module fex 102 slot 1 led beacon
```

```
hw-module fex 102 slot 2 led beacon
```

Unconfigure using no form of the CLI

```
Router(config)#no hw-module fex range 101-102 slot 1-2 led beacon
```
The below CLI to check if blue beacon led has been enabled for the respective slot.

```
Router#sh hw-module fex led beacon
    C6K FEX BLUE BEACON CONFIG
    ------------------------------------------------
    No blue beacon service configuration for your request.
```

- SSH X509.v3 certificate support
  https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/ssh/configuration_guide/15-sy/b_SSH_two_factor_authentication.html

Software Features from Earlier Releases

Use Cisco Feature Navigator to display supported features that were introduced in earlier releases.

Restrictions

Identifier	Component	Description
CSCvi28828	nat	Dynamic Nat preferred over Static Nat with Route maps, For overlapping IP addresses.
CSCvd67644	cat6000-cts	SGT cached for denied traffic on toggling caching on T2 VSS system
CSCvh68045	cat6000-env	Malfra is not downgraded for C6800-XX and C6880x cards from MK54 to MK53 whereas upgrade works fine.
CSCvd46951	cat6000-lisp	lisp map-cache going to data-signal: incomplete state while doing SSO on MS/MR
CSCvd15956	ip-acl	% A unknown access list with this name already exists msg when configuring a IPv6 RBACL

- If you use the linecards with the hardware version, IOS, and ROMMON versions listed in the table below, you can experience the following failures as the older IOS versions do not support the required new flashes:
  - Onboard Failure Logging (OBFL) feature will not work, since IOS will not be able to save data to non-volatile memory (flash).
  - Manual Rommon upgrade using CLI will not work.

PID	Hardware version	Minimum Rommon release required	Minimum IOS release required
C6800-32P10G-XL	2.1 or later	15.2(1r)SYL3 or later	15.2(1)SY4 or later 15.4(01)SY02 or later 15.5(1)SY or later
C6800-32P10G			
C6800-16P10G-XL			
C6800-16P10G			
C6800-8P10G-XL			
C6800-8P10G			
C6880-X-16P10G	2.2 or later	15.2(02r)SYL3 or later	
C6880-X-LE-16P10G			

Caveats in Release 15.4(1)SY4

Caveats Open in Release 15.4(1)SY4

Identifier	Component	Description
CSCvh55698	cat6000-env	%EARL-STBY-2-EARL_RECOVERY_PATCH: EARL Recovery Patch triggered! Reason:[Data bus idle]

Caveats Resolved in Release 15.4(1)SY4

Identifier	Component	Description
CSCvh55685	cat6000-routing	Hardware CEF programming incorrect for 2nd pass post "cle map-cache" of inactive flow
CSCvh63972	fib	Recover from FIB PI-PD disparity over map-request trigger (revised)

Caveats in Release 15.4(1)SY3

Caveats Open in Release 15.4(1)SY3

Identifier	Component	Description
CSCvg58188	cat6000-lisp	Traffic loss in lisp fun for lisp_chk_tx_rx.

Caveats Resolved in Release 15.4(1)SY3

Identifier	Component	Description
CSCvf27164	cat6000-lisp	I/O pool memory leak of packets from if_input 0x0 to Output_IDB LISP_RECIR
CSCve37515	cat6000-lisp	Adjacency leak on Linecards
CSCve95943	cat6000-mcast	SDA interoperability between Cat4k and Cat6k fails for Multicast Head End Replication
CSCvd75381	cat6000-routing	Standby crash with "cv6_create_fib_msg: malloc fail. p_msg is NULL" errors
CSCvf48937	lisp	Traffic loss in SDA every 2 mins with default border and 24hrs in Regular border
CSCvg31495	lisp	NMR calculation is wrongly considering eid-record of 0.0.0.0/0 in SDA

Caveats in Release 15.4(1)SY2

Caveats Open in Release 15.4(1)SY2

Identifier	Component	Description
CSCvd28587	cat6000-acl	removing lisp configuration and reconfiguring causes xtr to stop sending map request images
CSCvd99792	cat6000-acl	Memory leak @ FM_LISP_MAC_IFDATA on standby supervisor on unconfig and reconfig of \"router lisp\"
CSCvd73712	cat6000-cts	EARL Recovery Patch triggered! Reason:[Firmware Fatal Int] seen with VxLAN traffic
CSCve12808	cat6000-firmware	%SYS-SW1-3-CPUHOG: msg and traceback seen while doing swicthover with Multicast.
CSCve31063	cat6000-firmware	%RBM-SW1-3-RBM_ERR: No binding table for tableid 0x1E000002 af 2 -Process= \"RBM CORE\"
CSCvc46297	cat6000-firmware	QSFP in port 42 is not detected in 'show interface status' in C6840-X-LE-40G in specific condition
CSCvd44610	cat6000-lisp	IPv6 traffic from MPLS core not getting dest_idx = 0x7ff3 on toggling aggregate label cli
CSCvd85611	cat6000-lisp	Traffic drop of 7 sec seen on T1 VSS system when VSL link comes up
CSCve37515	cat6000-lisp	MK52,On Bootup, CPUHOG message from \"slcp process\" on standby while standby is coming up
CSCvd14755	lisp	6min of traffic drop observed post SSO after reload on T2 VSS system
CSCvd50891	mcast-pim	DNA-SA:DHCP option82 sol not working if DHCP server colocated on FBR

Caveats Resolved in Release 15.4(1)SY2

Identifier	Component	Description
CSCuy64806	cat6000-cm	Cisco IOS Port ACL Bypass Vulnerability

Identifier	Component	Description
CSCvc26305	cat6000-cts	DNA-SA SGT caching interop scale issues with Sup6T and Sup2T
CSCvc08872	cat6000-env	LISP: Decap Fails when Packet Received with Nonce Value
CSCva17615	cat6000-env	Faulty Sup2T in standby slot brings down all the Linecards
CSCvb55000	cat6000-firmware	MK51:Flapping GLCT link results in VSL link going down for T1 and T2
CSCuy12144	cat6000-firmware	40G intfs on primus goto faulty/bad EEPROM or connected/No connector
CSCvb94345	cat6000-firmware	SUP crash due to Reason: Failed TestL3TcamMonitoring
CSCvc26548	cat6000-hw-fwding	LIF access failed, leading to supervisor crash
CSCvb42724	cat6000-hw-fwding	FIB TCAM exception with less than Maximum routes - C6800-16P10G-XL
CSCvb98904	cat6000-routing	CPU hog TB HW-API background error msg seen with high usage in adj stats region
CSCuz84853	cat6k-vs-infra	C6807-XL VSS crashes when receiving an unexpecte VSLP packet
CSCvc43556	ip-acl	Removing/adding OGACE will delete the last regular ACE
CSCvc35325	mcast-pim	MK51-UCI, Mcast trafic is blackholing on ISSU CV while upgrading from FC5 to FC6

Caveats in Release 15.4(1)SY1

Caveats Open in Release 15.4(1)SY1

Identifier	Component	Description
CSCvb98772	cat6000-cts	SGT insertion in Vxlan fails at FBR if ingress is MPLS core
CSCvc06157	cat6000-cts	SGT translation fails at FBR doing both decap+encap
CSCvc26305	cat6000-cts	DNA-SA SGT caching interop scale issues with Sup6T and Sup2T
CSCvc46297	cat6000-env	QSFP in port 42 is not detected in 'show interface status' in C6840-X-LE-40G in specific condition
CSCva82153	cat6000-firmware	Control traffic dropped when Nappar LC in mixed mode using solano 40G adaptor
CSCuz10823	cat6000-lisp	Campus Fabric : VRF SGT tagging fails if "ipv4 sgt" not conf globally
CSCuz75479	cat6000-l2-mcast	mld-vpls: Traffic drop observed when 2 PEs join same mld v1 groups
CSCuz83289	cat6000-l2-mcast	mld-vpls: Mcast traffic not fwded to mrtr CE, src connected to remote PE
CSCvc43556	ip-acl	Removing/adding OGACE will delete the last regular ACE
CSCvc35325	mcast-pim	MK51-UCI, Mcast trafic is blackholing on ISSU CV while upgrading from FC5 to FC6
CSCti94813	pim	bidir: toggle "pim passive" --> (*,G) stay in pruned state forever

Caveats Resolved in Release 15.4(1)SY1

Identifier	Component	Description
CSCuz97414	aaa	Bulk-sync failure due to ip radius source-interface Vlan701 vrf VRF_MGMT

Identifier	Component	Description
CSCuy96262	cat6000-acl	%SCHED-THRASHING: Process thrashing
CSCva39982	cat6000-acl	IPv6 neighbor discovery packet processing behavior
CSCva77668	cat6000-acl	VSS Standby stalling in progress to cold-config due to CTS Manual
CSCut99842	cat6000-env	terminator crash but crashfile not getting generated
CSCva10981	cat6000-env	VSS crash at slot_online_change_notice
CSCva51425	cat6000-env	QuadSup:save information if sup reloads due to sw watchdog timeout
CSCvb48135	cat6000-env	C6840-X-LE-40G: port range 27-34, PID and VID are not properly displayed.
CSCvb70550	cat6000-env	C6832-X-LE Power supply issue
CSCvc08872	cat6000-env	LISP: Decap Fails when Packet Received with Nonce Value
CSCvb55000	cat6000-firmware	MK51:Flapping GLCT link results in VSL link going down for T1 and T2
CSCux89341	cat6000-l2-ec	L3 LACP port-channel flap with sub-if on native Vlan
CSCvb36172	cat6000-l2-mcast	IGMP Join for groups 224.0.0.x are programmed in the IGMP snooping table
CSCvb36981	cat6000-mcast	Multicast stream failures because of missing pmask in FPOE
CSCvb98904	cat6000-routing	CPU hog TB HW-API background error msg seen with high usage in adj stats region
CSCvb53731	cat6000-snmp	snmpset cpsIfVlanSecureMacAddrRowStatus deos not return MAC address for Voice VLAN
CSCva88391	cat6000-vntag	Memory exhaustion by VNTAG MGR PROCES
CSCva63922	dhcp	Config Sync:Bulk-sync failure due to Servicing Incompatibility at DHCPv6
CSCuz74951	cdp	VTP domain name tlv is not included in cdp packet
CSCva84482	crypto-engine	NVRAM Key Protection
CSCux76361	dot1x-ios	dACL removed for host with multiple IP addresses in IPDT
CSCvc22988	ifs	SUP6T experiences %DOSFS-SW1-5-DIBERR: error from eUSB
CSCva42833	ip-acl	Object groups with a unique combination command gets rejected
CSCty47047	ip-tunnels	%TUN-STBY-3-TUN_HA: Tunnel HA: Tunnel creation on standby: mismatch seen
CSCuz25390	ip-tunnels	IP tunnel inconsistencies cause memory corruption, crash
CSCvb29204	ipsec-isakmp	BenignCertain on IOS and IOS-XE
CSCva99178	lisp	LISP DDT: NMR for site EID prefix is returned for non-registered EIDs
CSCvb85039	lisp	LISP DDT: crash on removal of 'ddt' configuration
CSCva85178	mcast-pim	mtrose: WARNING msg to display on PIM dense mode configuration
CSCva93860	mcast-pim	PI Multicast code dropping 1st Mcast packet in IPv6 Anycast-RP
CSCva44687	mpls-mfi	ASR 1K Running IOS-XE 3.16S w/ MPLS Crashes on 'clear ip route *'
CSCva66819	pnpa	Non-Vlan1 did not get initiated with pnp startup-vlan conf after reload
CSCuz93302	snmp	Make SNMP-3-INPUT_QFULL_ERR errors easier to troubleshoot
CSCux86075	ssh	Unexpected crash during SSH operation
CSCuz88586	ssh	SSH RSA Keys are not seen show ip ssh
CSCva46459	ssh	SSH session hangs if its not closed properly
CSCvb16274	vpdn	PPTP Start-Control-Connection-Reply packet leaks router memory contents
CSCva08727	web-infra	WebUI: Tacacs not sending username with command authz/acct

Caveats in Release 15.4(1)SY

Caveats Open in Release 15.4(1)SY

Identifier	Component	Description
CSCuz24507	cat6000-cts	Campus Fabric : L2 CMD header not put post decap on FBN
CSCva76187	cat6000-cts	SGT caching doesn't work if the traffic destination is in Fabric
CSCva90003	cat6000-cts	Decap failed with known device SGT & RLOC IP-SGT mapping carried by SXP
CSCva51771	cat6000-firmware	CVR-4SFP10G-QSFP port with AOCXX cable does not coming up after reload
CSCva82153	cat6000-firmware	Multicast traffic black-holed with Nappar LC mixed mode
CSCva71890	cat6000-hw-fwding	LFA FRR MPLS TE routes are not advertising via Tunnel
CSCva43303	cat6000-lisp	CF:SGT at encap fails on FBR after decap and then encap on same FBR
CSCva65792	cat6000-lisp	Campus Fabric:VxLAN support over MPLS core with Explicit NULL label
CSCva83310	cat6000-lisp	CSCva62175 defect will still be seen for PITR+ETR combination
CSCuy97868	cat6000-lisp	Campus Fabric:SGT from incoming L2 CMD header not put into VxLAN
CSCuz10823	cat6000-lisp	Campus Fabric : VRF SGT tagging fails if "ipv4 sgt" not conf globally
CSCuz27152	fib	Campus Fabric: Ucast/Mcast is not working with VxLAN encapsulation on fly
CSCuo81285	http	File upload to IOS HTTP server
CSCva83436	http	http download not implemented/working

Troubleshooting

These sections describes troubleshooting guidelines for the Catalyst 6500 series switch configuration:

- System Troubleshooting, page 58
- Module Troubleshooting, page 59
- Additional Troubleshooting Information, page 59

System Troubleshooting

This section contains troubleshooting guidelines for system-level problems:

- When the system is booting and running power-on diagnostics, do not reset the switch.

- After you initiate a switchover from the active supervisor engine to the redundant supervisor engine, or when you insert a redundant supervisor engine in an operating switch, always wait until the supervisor engines have synchronized and all modules are online before you remove or insert modules or supervisor engines or perform another switchover.

- If you have an interface whose speed is set to **auto** connected to another interface whose speed is set to a fixed value, configure the interface whose speed is set to a fixed value for half duplex. Alternately, you can configure both interfaces to a fixed-value speed and full duplex.

Module Troubleshooting

This section contains troubleshooting guidelines for module problems:

- When you hot insert a module into a chassis, be sure to use the ejector levers on the front of the module to seat the backplane pins properly. Inserting a module without using the ejector levers might cause the supervisor engine to display incorrect messages about the module. For module installation instructions, refer to the *Catalyst 6500 Series Module Installation Guide*.

- Whenever you connect an interface that has duplex set to autonegotiate to an end station or another networking device, make sure that the other device is configured for autonegotiation as well. If the other device is not set to autonegotiate, the autonegotiating port will remain in half-duplex mode, which can cause a duplex mismatch resulting in packet loss, late collisions, and line errors on the link.

Additional Troubleshooting Information

For additional troubleshooting information, refer to the publications at this URL:

http://www.cisco.com/c/en/us/support/switches/catalyst-6500-series-switches/tsd-products-support-troubleshoot-and-alerts.html

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