

## Cisco Catalyst 6500 Series 16-Port 10 Gigabit Ethernet Module

### Features and Benefits

**Q. What new features and benefits does the Cisco® Catalyst® 6500 Series 16-Port 10 Gigabit Ethernet Module provide?**

**A.** The Cisco Catalyst 6500 Series 16-Port 10 Gigabit Ethernet module doubles the 10 Gigabit Ethernet port density supported on a Cisco Catalyst 6500 Series Switch, providing up to 132 10 Gigabit Ethernet ports per chassis or up to 264 10 Gigabit Ethernet ports per virtual switching system. In addition, the 16-port 10 Gigabit Ethernet module has reduced power consumption. It uses half the power consumption per port when compared to the 8-port 10 Gigabit Ethernet module, providing substantial power savings to the customer. The 16-port 10 Gigabit Ethernet module can operate in either oversubscription mode or performance mode, providing maximum flexibility for the customer to connect some ports to servers and some ports to wiring closet uplinks. In addition, when used with an E-Series chassis, both the 16-port 10 Gigabit Ethernet module and the 8-port 10 Gigabit Ethernet module support fast switch fabric failover time of ~50 ms, improving the network's high availability.

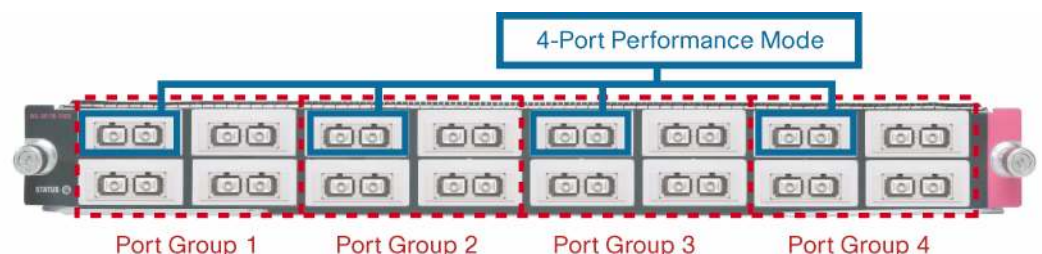
**Q. What is oversubscription mode and what is performance mode, and how can I enable them?**

**A.** The 16-port 10 Gigabit Ethernet module consists of 4 port groups of 4 ports each:

- Port group 1: ports 1–4; port 1 is enabled in performance mode.
- Port group 2: ports 5–8; port 5 is enabled in performance mode.
- Port group 3: ports 9–12; port 9 is enabled in performance mode.
- Port group 4: ports 13–16; port 13 is enabled in performance mode.

Figure 1 shows how the port group maps to the front panel of the 16-port 10 Gigabit Ethernet module.

**Figure 1.** Port Group Mappings on the Front Panel of the 16-port 10 Gigabit Ethernet Module



Each port group can operate in either oversubscription mode or performance mode. In oversubscription mode, you can use up to 4 ports in the port group. In performance mode, only the first port of the port group is enabled, and that port comes with enhanced buffering and quality-of-service (QoS) functionality. The other 3 ports in the port group will be administratively shut down. The 16-port 10 Gigabit Ethernet module works in oversubscription mode by default.

The software command

```
router(config)#[no] hw-module slot x oversubscription port-group y
```

will put port group y (1, 2, 3, or 4) in performance mode and administratively disable the oversubscribed ports (ports 2–4 in port group 1, ports 6–8 in port group 2, ports 10–12 in port group 3, and ports 14–16 in port group 4) and put them in shutdown state. In this mode, the user cannot do “no shut” on the disabled ports.

The following command will display the current configuration of all the port groups in slot x. The output of this command will be something like this:

```
Router# show hw-module slot x oversubscription
```

Port Group	Oversubscription Mode
1	Enabled
2	Disabled
3	Enabled
4	Disabled

**Q. What is the multicast replication performance on the 16-port 10 Gigabit Ethernet module?**

**A.** The 16-port 10 Gigabit Ethernet module provides ~50G of replication bandwidth per replication engine and 2 replication engines per module, providing superior multicast replication performance for multicast applications such as audio conferencing, video conferencing, and collaboration tools.

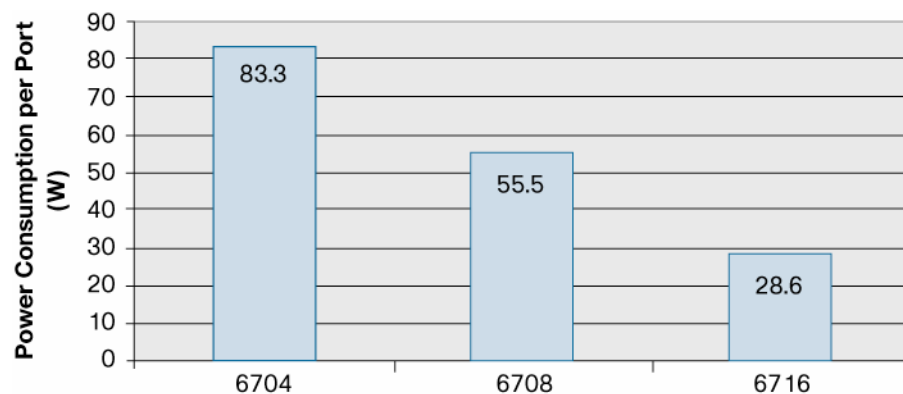
**Q. What multicast replication modes are supported?**

**A.** The 16-port 10 Gigabit Ethernet module supports ingress and egress multicast replication. Egress replication mode provides dramatically increased fanout because the multicast replication engine on the line card is only used for locally attached ports.

**Q. What has Cisco done to improve the power consumption of 10 Gigabit Ethernet modules?**

**A.** The 8-port 10 Gigabit Ethernet module introduced in 2006 consumes 33 percent less power per port than the 4-port 10 Gigabit Ethernet module. The 16-port 10 Gigabit Ethernet module being introduced now consumes half the power per port of an 8-port 10 Gigabit Ethernet module. See Figure 2 for details.

**Figure 2.** Cisco Catalyst 6500 10 Gigabit Ethernet Power Consumption Evolution



The power consumption shown in Figure 2 includes DFC3C and XENPAK/X2 transceivers. It excludes common equipment (for example, chassis and supervisor) power consumption.

## Specifications

### Q. What are the power requirements of the 16-port 10 Gigabit Ethernet modules?

A. The power requirements are as follows:

- 16-port 10 Gigabit Ethernet module with DFC3C (WS-X6716-10G-3C): 457.8W (10.9A @ 42V)
- (Base module: 389W [9.25A @ 42V], DFC3C: 69.3W [1.65A @ 42V])
- 16-port 10 Gigabit Ethernet module with DFC3CXL (WS-X6716-10G-3CXL): 487.2W (11.6A @ 42V)
- (Base module: 389W [9.25A @ 42V], DFC3CXL: 98.7W [2.35A @ 42V])
- This power requirement is inclusive of the power consumed by the 16 transceivers on a fully populated module.

### Q. What is the performance of the 16-port 10 Gigabit Ethernet module?

A. The 16-port 10 Gigabit Ethernet module has a 40-Gbps connection to the fabric so is 4:1 oversubscribed. The distributed forwarding card (DFC) can forward traffic at 48 Mpps.

### Q. What is the weight of the 16-port 10 Gigabit Ethernet module?

A. It weighs about 13 pounds, excluding X2 modules. Each X2 module weighs ¼ pound.

### Q. How much memory comes by default on this module?

A. Both the WS-X6716-10G-3C and WS-X6716-10G-3CXL come with 1 GB DRAM.

## Distributed Forwarding Card (DFC)

### Q. What is the difference between WS-X6716-10G-3C and WS-X6716-10G-3CXL?

A. Both modules offer 16 ports of 10 Gigabit Ethernet and share the same base board, WS-X6716-10GE. WS-X6716-10G-3C comes with distributed forwarding card 3C (WS-F6700-DFC3C), and WS-X6716-10G-3CXL comes with distributed forwarding card 3CXL (WS-F6700-DFC3CXL).

### Q. What is the difference between DFC3C and DFC3CXL?

A. DFC3CXL offers more scalability in terms of routes and NetFlow entries supported compared with DFC3C (Table 1).

**Table 1.** Feature Differences Between DFC3C and DFC3CXL

Feature	DFC3C	DFC3CXL
IPv4 Routes	256,000	1,000,000
IPv6 Routes	128,000	500,000
NetFlow Entries	128,000	256,000
Reflexive Access Control Lists (ACLs)	128,000	256,000

### Q. Will you be introducing a 16-port 10 Gigabit Ethernet module without the DFC?

A. The 16-port 10 Gigabit Ethernet module has a 40-Gbps connection to the fabric. For such a high-density 10 Gigabit Ethernet module, most of our customers would like to use it with the DFC to maximize switching performance. There is no plan to introduce a 16-port 10 Gigabit Ethernet module without the DFC.

**Q. Can we mix these 10 Gigabit Ethernet modules and other modules with centralized forwarding card (CFC) or other DFCs in the same chassis?**

**A.** Yes, we will support a mix of DFC and CFC in the same chassis. The chassis will operate in the mode of the lowest common denominator (Table 2).

**Table 2.** Chassis Mode of Operation with Mixed Supervisor Engines and DFCs

	DFC3A	DFC3B	DFC3BXL	DFC3C	DFC3CXL
<b>Supervisor Engine 720-3A</b>	PFC3A functionality	PFC3A functionality	PFC3A functionality	PFC3A functionality	PFC3A functionality
<b>Supervisor Engine 720-3B</b>	PFC3A functionality	PFC3B functionality	PFC3B functionality	PFC3B functionality	PFC3B functionality
<b>Supervisor Engine 720-3BXL</b>	PFC3A functionality	PFC3B functionality	PFC3BXL functionality	PFC3B functionality	PFC3BXL functionality
<b>Virtual Switching Supervisor Engine 720-10G with PFC3C</b>	PFC3A functionality	PFC3B functionality	PFC3B functionality	PFC3C functionality	PFC3C functionality
<b>Virtual Switching Supervisor Engine 720-10G with PFC3CXL</b>	PFC3A functionality	PFC3B functionality	PFC3BXL functionality	PFC3C functionality	PFC3CXL functionality

**Q. What new functions does DFC3C support?**

**A.** DFC3C supports all functions of DFC3B. In addition, it supports Virtual Switch Link (VSL) and 96K MAC entries. The 16-port 10 Gigabit Ethernet module will only support VSL in performance mode, and software support for this will be available after first customer ship (FCS).

**Q. I have purchased WS-X6716-10G-3C and would like to upgrade it to DFC3CXL. Is this field upgradable?**

**A.** Customers can purchase WS-F6700-DFC3CXL= to field upgrade WS-X6716-10G-3C to WS X6716-10G-3CXL. WS-F6700-DFC3CXL= upgrade kit comes with both the DFC3CXL daughter board as well as 1 GB DRAM. Since WS-X6716-10G-3C already comes with 1G DRAM as default, the 1 GB DRAM kit does not need to be installed on the WS-X6716-10G-3C for the DFC upgrade.

**Q. Since I do not need the 1 GB DRAM that comes with the DFC3CXL upgrade kit, can I use that on other modules?**

**A.** Yes, you can.

**Chassis/Supervisor/Software Interoperability**

**Q. Which chassis supports the 16-port 10 Gigabit Ethernet module? Are there any limitations?**

**A.** All Cisco Catalyst 6500 chassis support the 16-port 10 Gigabit Ethernet module. When operating in an E-Series chassis (6503-E, 6504-E, 6506-E, 6509-E, 6509-V-E), the 6509-NEB-A chassis with dual fan tray, the configuration is NEBS 3 compliant (supports operating temperatures up to 55°C). When operating in a non-E-Series chassis (6506, 6509, 6513), 6509-NEB-A chassis with single fan tray, fan tray 2 and 2500W or higher power supplies are required, and the configuration is not NEBS 3 compliant (supports operating temperatures up to 40°C only). This module is not supported in the Cisco Catalyst 6503 non-E Series chassis.

**Q. Which supervisor engine supports the 16-port 10 Gigabit Ethernet module?**

**A.** The 16-port 10 Gigabit Ethernet module works with any Virtual Switching Supervisor Engine 720-10G or Supervisor Engine 720, including VS-S720-10G-3C, VS-S720-10G-3CXL, WS-Sup720, WS-Sup720-3B, and WS-Sup720-3BXL.

**Q. Which software supports the 16-port 10 Gigabit Ethernet module?**

**A.** The official software release to support the Catalyst 6500 16 port 10 Gigabit Ethernet module is 12.2(33)SXH2 or above. Both IOS modularity and Native IOS release are supported.

**Q. Will Catalyst 6500 16 port 10 Gigabit Ethernet module be supported in a Virtual Switching System (VSS)?**

**A.** The Catalyst 6500 16 port 10 Gigabit Ethernet module will be supported in a Virtual Switching System with 12.2(33)SXH2 software or above. When using 12.2(33)SXH1 in VSS mode, the 16 port 10 Gigabit Ethernet module will be powered down.

**Q. Can I form a virtual switch link using the Catalyst 6500 10 Gigabit Ethernet module?**

**A.** Yes, you can form a virtual switch link using the 10 Gigabit Ethernet ports operating in performance mode. You cannot use the ports operating in oversubscribed mode to form a virtual switch link. Virtual switch link support on 16 port 10 Gigabit Ethernet module in performance mode will be available in 12.2(33)SXI software release.

**Q. Is VACL capture supported on Catalyst 6500 16 port 10 Gigabit Ethernet module?**

**A.** Yes, VACL capture is supported on the 16 port 10 Gigabit Ethernet module in 12.2(33)SXH2 or above.

**Q. Is the 16-port 10 Gigabit Ethernet module supported on Cisco 7600 Series Routers?**

**A.** No, it is not supported on Cisco 7600 Series Routers. It is not supported in Cisco IOS Software Release 12.2SR.

## Optics

**Q. What optics are available for the 16-port 10 Gigabit Ethernet module at FCS?**

**A.** The following optics are supported on the 16-port 10 Gigabit Ethernet module at FCS:

- X2-10GB-LRM: 220m over FDDI-grade MMF
- X2-10GB-SR: 26m over FDDI-grade MMF, 300m over 50-micron 2000 MHz\*km MMF
- X2-10GB-LR: 10 km over SMF
- X2-10GB-ER: 40 km over SMF
- X2-10GB-LX4: 300m over FDDI-grade MMF
- X2-10GB-CX4: 15m over 8-pair 100-Ohm InfiniBand cable

To meet EMI compliance, SR and CX4 requires version -02 or above; ER requires version -03 or above; LR and LX4 requires version -04 or above. There is no restriction on LRM. The above versions of these optics will be shipping when WS-X6716-10G-3C and WS-X6716-10G-3CXL FCS.

More transceivers will be supported over time. Refer to the data sheet or release notes for the latest list of supported transceivers.

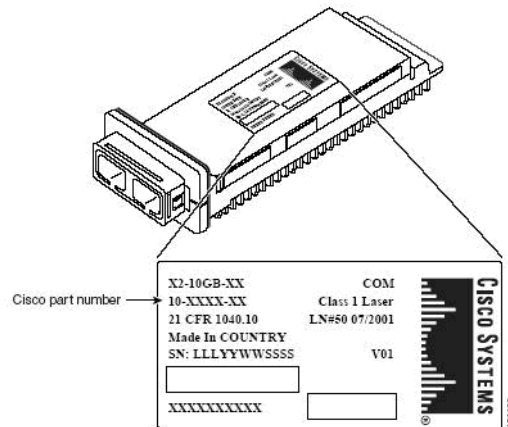
**Q. How do I order the above mentioned versions of these X2 modules?**

**A.** All SR, LR, ER, LX4, CX4 X2 modules shipped after the 16-port 10 Gigabit Ethernet module FCSed are the above mentioned versions or later. You can order the above X2 modules using the normal ordering process and will get the the above mentioned versions or later of these X2 modules.

**Q. I already have some Cisco X2 modules. How can I check their version?**

**A.** The version number is the last two digits of the Cisco part number. The Cisco part number is the second line on the label, shown in Figure 3 as 10-XXXX-XX.

**Figure 3.** Cisco Part Number on Cisco X2 Modules

**Q. What is the difference between the above mentioned versions of the X2 modules and prior versions??**

**A.** The above mentioned versions of the SR, LR, ER, LX4, CX4 X2 modules has EMI improvements over the prior versions.

**Q. Given that the 16-port 10 Gigabit Ethernet module has X2 optics, can I connect a device that supports XENPAK optics?**

**A.** X2 and XENPAK optics differ in form factor only. You can connect an X2 to a XENPAK as long as the optics are of the same transceiver type.

**For More Information**

For more information about Cisco Catalyst 6500 Series Switches, visit

<http://www.cisco.com/en/US/products/hw/switches/ps708/index.html> or contact your local account representative.



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