



# CHAPTER 1

## Product Overview

---

The Optical Services Modules (OSMs) are supported in the Cisco 7600 series router and Catalyst 6500 series switches. The OSMs are supported with the following system configurations:

- Supervisor Engine 720, PFC3A, and MSFC3
- Supervisor Engine SUP720-3BXL and PFC3BXL
- Supervisor Engine 2, Policy Feature Card 2 (PFC2), and Multilayer Switch Feature Card 2 (MSFC2)
- Supervisor Engine 2, PFC2, MSFC2, and Switch Fabric Module (SFM) or SFM2

Refer to the *Release Notes for Catalyst 6500 and Cisco 7600 Series Router Software Release 6.x* and the *Release Notes for Catalyst 6500 and Cisco 7600 Series Router for Cisco IOS Release 12.1E* and the *Release Notes for Cisco IOS Release 12.2 SX on the Catalyst 6500 and Cisco 7600 Supervisor Engine and MSFC* publications for complete information about the chassis, modules, software features, protocols, and MIBs supported by the OSMs.

## Contents

This chapter consists of these sections:

- [Overview, page 1-2](#)
- [Optical Services Modules, page 1-2](#)
- [Hardware Features, page 1-5](#)
- [Software Features, page 1-5](#)

# Overview

Table 1-1 describes the Cisco 7600 series router and Catalyst 6500 series chassis.

**Table 1-1 Cisco 7600 Series and Catalyst 6500 Series Chassis**

Chassis	Description
Cisco 7600 Series	Cisco 7603 series router—3 slots Cisco 7604 series router—4 slots Cisco 7606 series router—6 slots Cisco 7609 series router—9 vertical slots Cisco 7613 series router—13 slots
Catalyst 6500 Series	Catalyst 6504 switch—4 slots Catalyst 6506 switch—6 slots Catalyst 6509 switch—9 slots Catalyst 6509-NEB switch—9 vertical slots Catalyst 6513 switch—13 slots

For information on installing the for installing and connecting Optical Services Modules (OSMs) in Cisco 7600 series series routers and Catalyst 6500 series switches, see the *Optical Services Module Installation and Verification Note* at [http://www.cisco.com/en/US/docs/routers/7600/Hardware/Module\\_and\\_Line\\_Card\\_Installation\\_Guide/s/OSM\\_Installation\\_and\\_Verification\\_Note/78\\_11239.html](http://www.cisco.com/en/US/docs/routers/7600/Hardware/Module_and_Line_Card_Installation_Guide/s/OSM_Installation_and_Verification_Note/78_11239.html).

## Optical Services Modules

Table 2 lists the standard OSMs and Table 3 list the enhanced OSMs that are covered in this publication. For additional information on these modules, see the *Cisco 7600 Series Router Module Installation Guide* at

[http://www.cisco.com/en/US/docs/routers/7600/Hardware/Module\\_and\\_Line\\_Card\\_Installation\\_Guide/s/7600\\_Series\\_Router\\_Module\\_Installation\\_Guide/osmodule.html](http://www.cisco.com/en/US/docs/routers/7600/Hardware/Module_and_Line_Card_Installation_Guide/s/7600_Series_Router_Module_Installation_Guide/osmodule.html).

**Table 2 Standard Optical Services Modules**

Module	Description
OSM-2OC12-POS-MM, -SI, -SL	2-port OC-12 POS <sup>1</sup> , plus 4 Gigabit Ethernet ports (requires GBICs <sup>2</sup> ). The module has SC fiber connectors for use with MMF <sup>3</sup> and SMF <sup>4</sup> .
OSM-4OC12-POS-MM, -SI, -SL	4-port OC-12 POS, plus 4 Gigabit Ethernet ports (requires GBICs). The module has SC fiber connectors for use with MMF and SMF.
OSM-4OC3-POS-SI	4-port OC-3 POS, plus 4 Gigabit Ethernet ports (requires GBICs). The module has MT-RJ connectors for use with MMF and SMF.
OSM-8OC3-POS-SI, -SL	8-port OC-3 POS, plus 4 Gigabit Ethernet ports (requires GBICs). The module has MT-RJ connectors for use with MMF and SMF.

**Table 2** Standard Optical Services Modules (continued)

Module	Description
OSM-16OC3-POS-SI, -SL	16-port OC-3 POS, plus 4 Gigabit Ethernet ports (requires GBICs). The module has MT-RJ connectors for use with MMF and SMF.
OSM-1OC48-POS-SS, -SI, -SL	1-port OC-48 POS, plus 4 Gigabit Ethernet ports (requires GBICs). The module has SC fiber connectors for use with SMF.
OSM-2OC48/1DPT-SS, -SI, -SL	2-port OC-48 DPT <sup>5</sup> /POS, plus 4 Gigabit Ethernet ports (requires GBICs). The module has LC fiber connectors for use with SMF.
OSM-2OC12-ATM-MM, SI	2-port OC-12 ATM <sup>6</sup> , plus 4 Gigabit Ethernet ports (require GBICs). The module has SC fiber connectors for use with MMF and SMF.
OSM-4GE-WAN-GBIC	4-port Gigabit Ethernet (requires GBICs).

1. POS = Packet over SONET.
2. GBIC = Gigabit Interface Converters; GBICs are available in three styles (SX, LX/LH, and ZX) and have an SC connector for use with either MMF or SMF.
3. MMF = multimode fiber.
4. SMF = single-mode fiber.
5. DPT = Dynamic Packet Transport.
6. ATM = Asynchronous Transfer Mode.

**Table 3** Enhanced Optical Services Modules

Module	Description
OSM-2OC12-POS-MM+, -SI+	2-port OC-12 POS <sup>1</sup> , plus 4 Gigabit Ethernet ports (requires GBICs <sup>2</sup> ). The module has SC fiber connectors for use with MMF <sup>3</sup> and SMF <sup>4</sup> .
OSM-4OC12-POS-SI+	4-port OC-12 POS, plus 4 Gigabit Ethernet ports (requires GBICs). The module has SC fiber connectors for use with SMF.
OSM-4OC3-POS-SI+	4-port OC-3 POS, plus 4 Gigabit Ethernet ports (requires GBICs). The module has MT-RJ connectors for use with SMF.
OSM-8OC3-POS-SI+, -SL+	8-port OC-3 POS, plus 4 Gigabit Ethernet ports (requires GBICs). The module has MT-RJ connectors for use with SMF.
OSM-16OC3-POS-SI+	16-port OC-3 POS, plus 4 Gigabit Ethernet ports (requires GBICs). The module has MT-RJ connectors for use with MF.
OSM-1OC48-POS-SS+, -SI+, -SL+	1-port OC-48 POS, plus 4 Gigabit Ethernet ports (requires GBICs). The module has SC fiber connectors for use with SMF.
OSM-1CHOC12/T3-SI <sup>5</sup>	1-port channelized OC-12, plus 4 Gigabit Ethernet ports (requires GBICs). The module has LC fiber connectors for use with SMF.
OSM-12CT3/DS0 <sup>5</sup>	12-port channelized T3. The module has mini-SMB connectors for use with 75-Ohm copper coax cable.
OSM-1CHOC12/T1-SI <sup>5</sup>	1-port channelized OC-12, plus 4 Gigabit Ethernet ports (requires GBICs). The module has LC fiber connectors for use with SMF.
OSM-2OC12-ATM-MM+, SI+	2-port OC-12 ATM <sup>6</sup> , plus 4 Gigabit Ethernet ports (require GBICs). The module has SC fiber connectors for use with MMF and SMF.
OSM-2+4GE-WAN+	2-port Layer 2 Gigabit Ethernet LAN and 4-port Layer 3 Gigabit Ethernet WAN (all ports require GBICs).

1. POS = Packet over SONET.
2. GBIC = Gigabit Interface Converters; GBICs are available in three styles (SX, LX/LH, and ZX) and have an SC connector for use with either MMF or SMF.
3. MMF = multimode fiber.
4. SMF = single-mode fiber.
5. The channelized OSMs are supported only on the Cisco 7600 series router platform.
6. ATM = Asynchronous Transfer Mode.

# Hardware Features

Refer to the *OSM Installation and Verification Note* for a description of the hardware features supported on the OSMs:

[http://www.cisco.com/en/US/docs/routers/7600/Hardware/Module\\_and\\_Line\\_Card\\_Installation\\_Guide/s/OSM\\_Installation\\_and\\_Verification\\_Note/78\\_11239.html](http://www.cisco.com/en/US/docs/routers/7600/Hardware/Module_and_Line_Card_Installation_Guide/s/OSM_Installation_and_Verification_Note/78_11239.html)

# Software Features

The following software features are supported on the OSMs:

- [Layer 2 Software Features, page 1-5](#)
- [Encapsulation Features, page 1-6](#)
- [Network Management Application Software, page 1-6](#)
- [Traffic Management Features, page 1-7](#)
- [Quality of Service, page 1-8](#)
- [Destination Sensitive Services, page 1-9](#)
- [Multiprotocol Label Switching, page 1-9](#)
- [Ethernet over Multiprotocol Label Switching, page 1-10](#)

**Note**

Features in the Cisco IOS 12.2SX releases that are also supported in the Cisco IOS 12.2 mainline, 12.2T and 12.2S releases are documented in the corresponding publications for those releases. When applicable, this section refers to those publications for platform-independent features supported in the Cisco IOS 12.2SX releases. The Cisco IOS 12.2S releases do not support software images for the Cisco 7600 series routers, and the Cisco IOS 12.2S publications do not list support for the Cisco 7600 series routers.

# Layer 2 Software Features

The Gigabit Ethernet ports on the OSMs are configured from the supervisor engine of the Catalyst 6500 series switch or the Cisco 7600 series router.

For feature support and configuration information for the OSM Layer 2 Gigabit Ethernet ports, refer to these publications:

*Catalyst 6500 Series Cisco IOS Software Configuration Guide, 12.2 SX* and the *Catalyst 6500 Series Cisco IOS Command Reference, 12.2 SX* at these URLs:

[http://www.cisco.com/en/US/docs/switches/lan/catalyst6500/catos/8.x/configuration/guide/config\\_gd.html](http://www.cisco.com/en/US/docs/switches/lan/catalyst6500/catos/8.x/configuration/guide/config_gd.html)

<http://www.cisco.com/en/US/docs/switches/lan/catalyst6500/ios/12.2SXF/native/command/reference/cmdref.html>

*Cisco 7600 Series Cisco IOS Software Configuration Guide, 12.2 SX* and the *Cisco 7600 Series Cisco IOS Command Reference, 12.2 SX* at these URLs:

<http://www.cisco.com/en/US/docs/routers/7600/ios/12.2SXF/configuration/guide/swcg.html>

[http://www.cisco.com/en/US/products/ps6017/prod\\_command\\_reference\\_list.html](http://www.cisco.com/en/US/products/ps6017/prod_command_reference_list.html)

## Encapsulation Features

The following encapsulation features are supported on the OSM WAN ports:

- High-Level Data Link Control (HDLC) protocol
- Point-to-Point Protocol (PPP)
- PPP over SONET/SDH (RFC 2615)
- PPP in HDLC-like framing (RFC 1662)
- SONET 1+1 Automatic Protection Switching
- SDH 1+1 Multiplex Section Protection (MSP)

Configure the serial interface encapsulation as described in the *Cisco IOS Interface Configuration Guide* under “Configuring Serial Interfaces” and in the *Cisco IOS Interface Command Reference* publication at these URLs:

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/inter\\_c/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/inter_c/index.htm)

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/inter\\_r/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/inter_r/index.htm)

- Frame Relay

Configure Frame Relay as described in the *Cisco IOS Wide-Area Networking Configuration Guide*, Release 12.1 under “Configuring Frame Relay” and in the *Cisco IOS Wide-Area Networking Command Reference*, Release 12.1 at these URLs:

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/wan\\_c/wcdfrely.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/wan_c/wcdfrely.htm)

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/wan\\_r/wrdfrely.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/wan_r/wrdfrely.htm)

Configure traffic shaping for Frame Relay as described in the *Cisco IOS Quality of Service Solutions Configuration Guide* under “Configuring Distributed Traffic Shaping” at this URL:

[http://www.cisco.com/en/US/docs/ios/12\\_2/qos/configuration/guide/qcfdts.html](http://www.cisco.com/en/US/docs/ios/12_2/qos/configuration/guide/qcfdts.html)

- Multilink Frame Relay (FRF.16)

Configure FFR.16 as described at

[http://www.cisco.com/en/US/docs/ios/12\\_2s/feature/guide/fs\\_mfr.html](http://www.cisco.com/en/US/docs/ios/12_2s/feature/guide/fs_mfr.html).




---

**Note** FRF.16 not supported on CHOC12-T3 OSM.

---

- The following restrictions apply to FFR.16 with the Channelized OSMs:
- There is a maximum 168 bundles with two T1/E1 links.
- There is a maximum 12 links in the bundle.
- For the OSM-12CT3/T1 and OSM-2CHOC12/T1, all the links must be of T1 bandwidth or E1 bandwidth.
- There is a maximum of 1024 channels (including the multilink frame relay [MFR] bundle).
- Using Cisco Discovery Protocol (CDP) on MFR interfaces is not recommended because of excessive cpu usage if a large number of sub-interfaces are configured.

## Network Management Application Software

The following network management application software is supported on the OSMs:

- CiscoWorks2000  
Installation and administration information for CiscoWorks2000 is available at this URL:  
<http://www.cisco.com/univercd/cc/td/doc/product/rtrmgmt/cw2000/index.htm>
- CiscoView  
Installation and administration information for CiscoView is available in the *Using CiscoView 5.3* publication at this URL:  
[http://www.cisco.com/univercd/cc/td/doc/product/rtrmgmt/cw2000/cw2000\\_d/2steditn/use\\_view/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/rtrmgmt/cw2000/cw2000_d/2steditn/use_view/index.htm)
- AtmDirector  
For information on using AtmDirector, refer to the *Using AtmDirector* publication at this URL:  
[http://www.cisco.com/univercd/cc/td/doc/product/rtrmgmt/cw2000/camp\\_mgr/cwsi\\_2x/cwsi\\_2\\_2/atmd\\_c/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/rtrmgmt/cw2000/camp_mgr/cwsi_2x/cwsi_2_2/atmd_c/index.htm)
- VlanDirector  
For information on using VlanDirector, refer to the *Using VlanDirector* publication at this URL:  
[http://www.cisco.com/univercd/cc/td/doc/product/rtrmgmt/cw2000/camp\\_mgr/cwsi\\_2x/cwsi\\_2\\_2/vd\\_c/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/rtrmgmt/cw2000/camp_mgr/cwsi_2x/cwsi_2_2/vd_c/index.htm)
- Cisco command-line interface (CLI) support
- SNMP support  
Information on CLI and SNMP support is found in the *Cisco IOS Configuration Fundamentals Configuration Guide* and the *Cisco IOS Configuration Fundamentals Command Reference* publication at these URLs:  
[http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/fun\\_c/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/fun_c/index.htm)  
[http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/fun\\_r/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/fun_r/index.htm)

## Traffic Management Features

The OSMs support the following traffic management features:

- Common Open Policy Service (COPS)  
Configure COPS as described in the *COPS for RSVP* Feature Module at this URL:  
<http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121t/121t1/copsrsvp.htm>
- Resource Reservation Protocol (RSVP)  
Configure RSVP as described in *Cisco IOS Quality of Service Solutions Configuration Guide*, Release 12.1 at this URL:  
[http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/qos\\_c/qcprt5/qcdrsvp.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/qos_c/qcprt5/qcdrsvp.htm)
- Differentiated Services Control Point (DSCP)
- IP precedence with ToS reclassification
- Classification and priority marking based on the following:
  - Ethertype

- IP source address (SA)
- IP destination address (DA)
- TCP port number
- UDP port number
- IP SA + TCP/UDP port number + IP DA + TCP/UDP port number
- Destination Sensitive Services (DSS)

## Quality of Service

If your Catalyst 6500 series switch or Cisco 7600 series router is running Cisco IOS software on the MSFC2 and Catalyst software on the supervisor engine, QoS is configured using the Modular QoS Command Line Interface (MQC) and the Catalyst 6500 supervisor engine CLI commands. If you are running Cisco IOS software only, QoS is configured using existing Modular QoS Command Line Interface (MQC).

Refer to the Cisco IOS QoS solutions publications and Catalyst 6500 publications listed below for QoS configuration information.

The OSMs support the following QoS implementations:

- Differentiated services code point (DSCP) and IP precedence classification
- Class-based traffic shaping
- Class-based weighted fair queuing (CBWFQ)

For a list of the modules that support CBWFQ, see [Chapter 9, “Configuring QoS on the Optical Services Modules.”](#)

- Low latency queuing (LLQ)
- Weighted Random Early Detection (WRED)

For a list of the modules that support WRED, see [Chapter 9, “Configuring QoS on the Optical Services Modules.”](#)

- Hierarchical Shaping (supported on Frame Relay, ARPA, dot1q, HLDC, and PPP encapsulations.)

For QoS configuration information and examples, see [Chapter 9, “Configuring QoS on the Optical Services Modules.”](#)

For general information on how to configure QoS, refer to the *Cisco IOS Quality of Service Solutions Configuration Guide* and the *Cisco IOS Quality of Service Solutions Command Reference* publication at these URLs:

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/fsecur\\_c/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/fsecur_c/index.htm)

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/qos\\_r/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/qos_r/index.htm)

For general information on how to configure QoS features on Catalyst 6500 systems running Cisco IOS software on the MSFC2 and Catalyst software on the supervisor engine, refer to the *Catalyst 6500 Series Command Reference* publication at these URLs:

[http://www.cisco.com/en/US/products/hw/switches/ps708/prod\\_command\\_reference\\_list.html](http://www.cisco.com/en/US/products/hw/switches/ps708/prod_command_reference_list.html)

For general information on how to configure QoS features on the Cisco 7600 series router running Catalyst operating software on the Supervisor Engine 2 and Cisco IOS software on the MSFC2, refer to the *Cisco 7600 Optical Services Router Software Configuration Guide* and the *Cisco 7600 Optical Services Router Command Reference* publications at these URLs:



<http://www.cisco.com/en/US/products/index.html>

For general information on how to configure QoS features on Catalyst 6500 systems running Cisco IOS software on the supervisor engine and the MSFC, refer to the *Catalyst 6500 Series Software Configuration Guide* at this URL:

<http://www.cisco.com/en/US/docs/switches/lan/catalyst6500/ios/12.1E/native/configuration/guide/swonfig.html>

For general information on how to configure QoS features on the Cisco 7600 Supervisor Engine 2 running Cisco IOS software, refer to the *Cisco 7600 Series Router Software Configuration Guide* at this URL:

<http://www.cisco.com/en/US/docs/routers/7600/ios/15S/configuration/guide/qos.html>

## Destination Sensitive Services

Destination Sensitive Services (DSS) allow traffic accounting and traffic shaping to known autonomous system numbers in order to better engineer and plan network circuit peering and transit agreements. DSS is supported on ingress and egress POS ports on the OC-3, OC-12, and OC-48 POS OSMs and on the GE-WAN ports on the four-port Gigabit Ethernet WAN (GBIC) OSMs.

DSS consists of these two components:

- Destination Sensitive Billing (DSB)

DSB allows accounting based on destination traffic indexes and provides a means of classifying customer traffic according to the route that the traffic travels. Trans-Pacific, Trans-Atlantic, satellite, domestic, and other provider traffic can be identified and accounted for on a destination network basis when the customer traffic is on a unique software interface. DSB provides packet and byte counters, which represent counts for IP packets per destination network. DSB is implemented using route-maps to classify the traffic into one of seven possible indexes, which represent a traffic classification.

- Destination Sensitive Traffic Shaping (DSTS)

DSTS performs inbound and outbound traffic shaping based on the destination traffic index configuration. DSTS is supported with ingress DSS only.

See [Chapter 10, “Configuring Destination Sensitive Services on the Optical Services Modules”](#) for configuration information.

## Multiprotocol Label Switching

MPLS is supported on all Catalyst 6500 and Cisco 7600 series modules.

For information about platform-specific limitations and restrictions, and supported features, see [Chapter 11, “Configuring Multiprotocol Label Switching on the Optical Services Modules.”](#)

For information on MPLS and how to configure it on the OSMs, refer to the Multiprotocol Label Switching on Cisco Routers Feature Module at this URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121t/121t5/mpls4t.htm>.

For general information on MPLS, refer to *Multiprotocol Label Switching* at this URL:

[http://www.cisco.com/en/US/products/ps6557/products\\_ios\\_technology\\_home.html](http://www.cisco.com/en/US/products/ps6557/products_ios_technology_home.html)

## Ethernet over Multiprotocol Label Switching

Ethernet over Multiprotocol Label Switching (EoMPLS) is supported on all all Catalyst 6500 and Cisco 7600 series modules and the FlexWAN modules. You can configure EoMPLS using PFC3BXL-based systems or OSM-based systems.

EoMPLS allows you to connect two VLAN networks that are in different locations without using bridges, routers, or switches at the VLAN locations. You can enable the MPLS backbone network to accept Layer 2 VLAN traffic by configuring the label edge routers (LERs) at both ends of the MPLS backbone.

For information about EoMPLS and how to configure it, see [Chapter 11, “Configuring Multiprotocol Label Switching on the Optical Services Modules.”](#)