


Cisco 7600 Series High Speed WAN Aggregation



The rapid growth of the Internet and Internet-enabled applications has amplified the scale and scope of bandwidth provisioned through service provider access networks. As a result of these increasing bandwidth requirements, service providers have begun offering faster connectivity options, such as DS3/E3 and OC-3/STM-1 and OC-12/STM-4, to their customers. The Cisco 7600 Series router enables service providers to provide high-speed connectivity and IP services to increase revenue and reduce operational costs.

Revenue Generation

Service providers generate revenue by offering network access and services that add value to that connectivity for their customers. However, the economics of supply and demand dictate that simply offering a commodity of access alone is not enough to sustain a revenue stream. Service providers must differentiate their offerings through value-added services such as quality of service (QoS), multicast, and security. This enables service providers to not only differentiate their offerings, but also to charge a premium for those services.

Increasing Operational Efficiency

While charging premiums for value-added services increases the revenue stream of service providers, increasing operational efficiency provides a sustainable advantage. New investments in technology must be cost-effective and take advantage of current demands with the flexibility for future growth. Increasing high-speed access port densities and incorporating new capabilities into currently deployed and scalable platforms enables service providers to confidently invest and train on a short-list of platforms in order to reduce training time and facilitate multiple uses for the same investment.

To help service providers generate incremental revenue and increase operational efficiency, Cisco Systems now offers the Cisco 7600 for high-speed WAN edge aggregation. The Cisco 7600 provides industry-leading DS3 and OC-3c port-density while applying unparalleled IP services.



Cisco 7600 Series

The Cisco 7600 is the highest performing and scalable service-rich platform for high-speed WAN edge aggregation in the industry. Combined with high-touch IP services and the high-speed WAN modules specifically intended for service provider networks the Cisco 7600 is the ultimate high-speed WAN aggregation platform.

Each Cisco 7600 provides a NEBS-3-compliant chassis and optional fully redundant route processing and forwarding with support for Border Gateway Protocol 4 (BGP4), Intermediate System-to-Intermediate System (IS-IS), and Open Shortest Path First (OSPF). In addition, the Cisco 7600 supports QoS, security, traffic shaping, traffic accounting and billing. The Cisco 7600 also includes an optional 256-Gbps switch fabric that enables high aggregate throughput throughout the chassis.

The Cisco 7600 can be configured with Optical Services Modules (OSMs) and any combination of traditional Cisco Catalyst 6000 Series interfaces, including the FlexWAN module. The FlexWAN module enables the use of a wide variety of WAN interfaces common to the Cisco 7200 and Cisco 7500 Series routers. In summary, the Cisco 7600 provides WAN connectivity from DS0 through OC-48c/STM-16c and LAN interfaces from 10-Mbps Ethernet to Gigabit Ethernet.

The Cisco 7600 high-speed WAN aggregation portfolio comprises four Optical Services Modules (OSMs) and one port adapter.

- 1- and 2-port channelized OC-48c/STM-16c
- 4- and 8-port channelized OC-12c/STM-4c
- 2- and 4-port OC-12c/STM-4c
- 8- and 16-port OC-3c/STM-1c
- 1-port, multichannel STM-1c Port Adapter on FlexWAN

Channelized Optical Services Modules¹

The Cisco 7600 provides two channelized OSMs: the ChOC-48/ChSTM-16 and ChOC-12/ChSTM-4. The channelized four-port OC-12/STM-4 and channelized one-port OC-48/STM-16 are ideally suited for service providers that focus on high-touch IP services and high-speed service delivery with little to no over-subscription. Service providers focused on cost savings and high-density leased-line connections with over-subscription are best served by the channelized eight-port OC-12/STM-4 and channelized two-port OC-48/STM-16 modules.

Both the ChOC-12/ChSTM-4 and the ChOC-48/ChSTM-16 OSMs support concurrent, mixed-channel configurations including OC-3c, STM-1c, DS3, and E3. Four additional Gigabit Ethernet interfaces, which can be used for Layer 2 or Layer 3 network connectivity, further enhance the functionality of each OSM. These line cards enable service providers to scale network bandwidth and performance while offering a wide range of IP services.

Clear-Channel Optical Services Modules

The Cisco 7600 offers two discrete high-speed WAN aggregation OSMs: the 2- and 4-port OC-12c/STM-4c and the 8- and 16-port OC-3c/STM-1c. Both OSMs provide the same IP services that are synonymous with the Cisco 7600 including QoS, security, traffic shaping, traffic accounting and billing.

1. SDH features will be supported in a future hardware release planned for Q3 CY '01.



Like the channelized OSMs, the clear-channel OC-12c/STM-4c and OC-3c/STM-1c OSMs include four additional Gigabit Ethernet interfaces with Layer 2 or Layer 3 network connectivity. These line cards enable service providers to scale network bandwidth and performance while offering a wide range of IP services.

Multichannel STM-1 Port Adapter for the FlexWAN Module

The PA-MC-STM-1 Port Adapter is ideal for today's rapidly expanding WAN environment. The port adapter meets a variety of service interconnect requirements, including concurrent support for leased line and Frame Relay. In conjunction with FlexWAN, service providers can connect the STM-1 ports into these services for aggregation of a large number of remote sites. As an integral part of a service node where customer bandwidth needs are uncertain, the single-port PA-MC-STM-1 allows service providers to avoid determining in advance how up to 256 logical ports will be allocated between DS0, NxDS0, and E1.

Feature Summary

Optical Services Modules include the same features.

- Parallel Express Forwarding (PXF) IP Services Processor — Consists of a 4 x 4 array of micro-processing units, each equipped with local memory, to deliver a pipelined, parallel processing array. Each PXF processor can apply IP services to 16 different packets simultaneously—all at high levels of performance.
- High-performance forwarding of distributed IP service — Achieves unidirectional throughput of up to 6 Mpps per PXF IP services processor.
- Programmable software feature sets for “evergreen” IP service delivery — Unlike traditional ASICs, which have feature sets hard-coded in silicon, each PXF engine can be field enhanced via easy software upgrade
- Deep packet buffering to maximize TCP throughput — Ensures deterministic packet delivery with advanced traffic management and prioritization schemes.
- Four additional ports of Gigabit Ethernet (excluding four-port GE WAN OSM) — Provides connectivity to other routers or servers without burning up “customer facing” slots.
- Compatibility with either the new Cisco 7600 or the Cisco Catalyst 6500 chassis.

Table 1 Port Densities per 9 slot Chassis

	DS0	DS1	DS3	OC-3/STM-1	OC-12/STM-4
1-port Channelized OC-48 / STM-16	N/A	N/A	384	128	N/A
2-port Channelized OC-48 / STM-16	N/A	N/A	768	256	N/A
4-port Channelized OC-12 / STM-4	N/A	N/A	384	128	N/A
8-port Channelized OC-12 / STM-4	N/A	N/A	768	256	N/A
MC STM-1 on FlexWAN	3000	1008	N/A	N/A	N/A
2-port OC-12c / STM-4c	N/A	N/A	N/A	N/A	16
4-port OC-12c / STM-4c	N/A	N/A	N/A	N/A	32
8-port OC-3c / STM-1c	N/A	N/A	N/A	64	N/A
16-port OC-3c / STM-1c	N/A	N/A	N/A	128	N/A

Values calculated using a 9-slot chassis with one Supervisor module and eight open slots.

Table 2 Port Densities per 7ft Rack

	DS0	DS1	DS3	OC-3/STM-1	OC-12/STM-4
1-port channelized OC-48/STM-16	N/A	N/A	1152	384	96
2-port channelized OC-48/STM-16	N/A	N/A	2304	768	192
4-port channelized OC-12/STM-4	N/A	N/A	1152	384	96
8-port channelized OC-12/STM-4	N/A	N/A	2304	768	192
MC STM-1 on FlexWAN	9000	3024	N/A	N/A	N/A
2-port OC-12/STM-4	N/A	N/A	N/A	N/A	42
4-port OC-12/STM-4	N/A	N/A	N/A	N/A	84
8-port OC-3/STM-1	N/A	N/A	N/A	168	N/A
16-port OC-3/STM-1	N/A	N/A	N/A	336	N/A

Values calculated using three 9-slot chassis in a seven foot rack, each with one Supervisor module and eight open slots.



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