

Ethernet Rate Limiting for the Cisco ONS 15327 Multi-Service Provisioning Platform using the Cisco Catalyst 3550 Series

The Cisco ONS 15327 SONET Multiservice Provisioning Platform (MSPP) provides a foundation to build a next-generation transport network. Incorporating innovative features such as 10/100BASE-T and Gigabit Ethernet transport over Synchronous Optical Network (SONET) has enabled the Cisco ONS 15327 to be deployed in a wide variety of networks, including service provider, enterprise, government, cable television multiple system operator (MSO), Internet service provider (ISP), and utility provider. It can be used with the Cisco Catalyst[®] 3550 Series Intelligent Ethernet Switch to provide enhanced Cisco IOS[®] Software features and rate limiting, creating an effective carrier-class Ethernet solution.

Figure 1



Cisco ONS 15327



Cisco Catalyst 3550 Series

Service providers today are seeking cost-effective solutions for offering their customers a protected, fiber-fed Ethernet and time-division-multiplexing (TDM) service. The combination of the Cisco ONS 15327 and Cisco Catalyst 3550 Series provides this solution. The Cisco ONS 15327 provides the optical protection and transport at OC-3, OC-12, and OC-48 rates, as well as DS1 and DS3 services. The Cisco ONS 15327 also provides simple 10/100BASE-T and Gigabit Ethernet transport services. When service providers require more sophisticated Ethernet solutions, such as ingress rate limiting, quality of service (QoS), access control lists (ACLs), and 802.1Q trunking, the Cisco Catalyst 3550 Series can be paired with the Cisco ONS 15327 for a full-featured Ethernet and TDM solution.

The Cisco ONS 15327 and Cisco Catalyst 3550 Series interconnection can be at 10/100BASE-T or Gigabit Ethernet, depending on the Ethernet bandwidth the customer requires. The Cisco ONS 15327 can be equipped with four-port 10/100BASE-T cards or two-port Gigabit Ethernet cards. The Cisco Catalyst WS-3550-24 features 24 10/100BASE-T and two gigabit interface converter (GBIC) ports that support Gigabit Ethernet.

Service providers might have multiple customers at a node and want to control the percentage of the allocated bandwidth that each customer gets. With the addition of the Cisco Catalyst 3550 Series to their Ethernet solution, service providers can control the amount of bandwidth a customer receives and charge accordingly.

Cisco ONS 15327

The Cisco ONS 15327 is a carrier-class MSPP built with the same technology as the industry-leading Cisco ONS 15454, but it is targeted for the customer-premises environment. It is a three-rack-unit, front-access platform offering OC-48, OC-12, OC-3, DS3, DS1, and 10/100 Ethernet, Fast Ethernet, and Gigabit Ethernet services. For optical-level protection, the Cisco ONS 15327 supports SONET unidirectional path switched ring (UPSR), bidirectional line switched ring (BLSR), and 1+1 configurations.

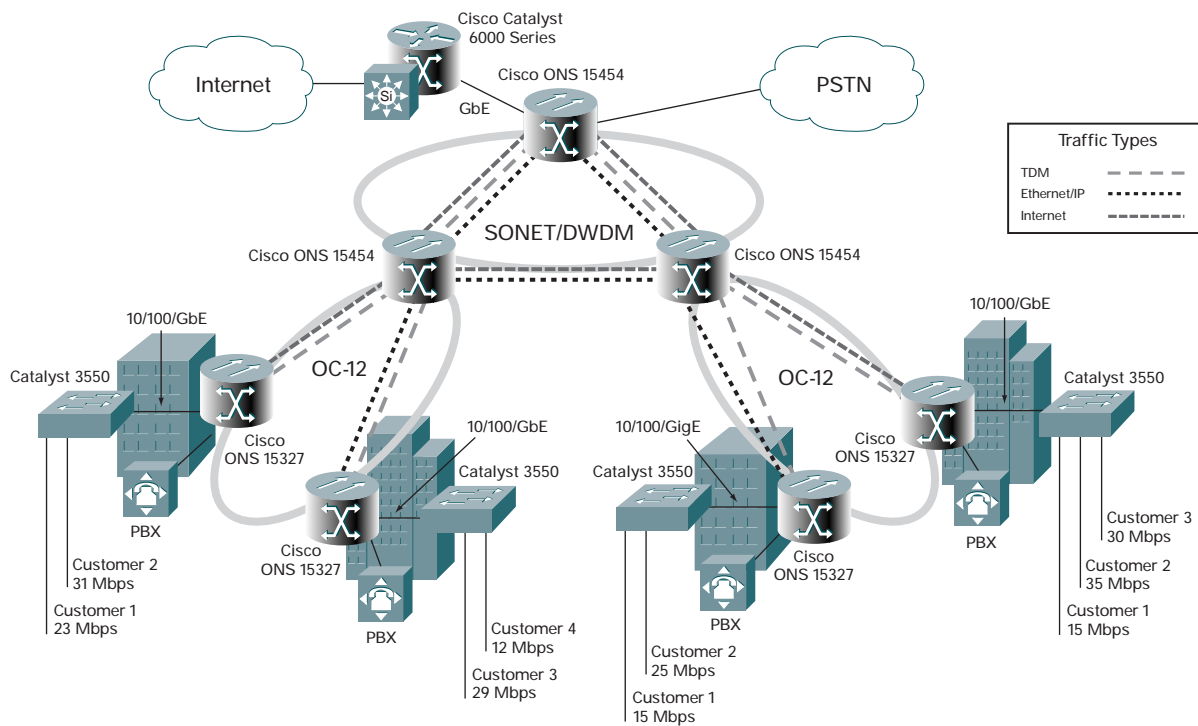
Cisco Catalyst 3550 Series

The Cisco Catalyst 3550 Series is a stackable, multilayer switch that provides high availability, security, and QoS to enhance the operation of the network. With a range of Fast Ethernet and Gigabit Ethernet configurations, the Cisco Catalyst 3550 Series can serve as a powerful access layer switch for medium-sized enterprise wiring closets and also as a backbone switch for small networks. Cisco Catalyst 3550 Series switches can be used to deploy network-wide intelligent services-such as advanced QoS, rate limiting, Cisco security ACLs, multicast management, and high-performance IP routing-while maintaining the simplicity of traditional LAN switching.

Solution

The customer's Ethernet traffic is aggregated out of either the 10/100BASE-T or Gigabit Ethernet ports on the Cisco 3550 Series that interface with the 10/100BASE-T or Gigabit Ethernet interfaces on the Cisco ONS 15327 (Figure 1). The Cisco ONS 15327 maps the Ethernet traffic into a SONET frame and forwards it across the metro network. The Cisco ONS 15327 provides the transport with SONET protection and restoration. When the destination is reached, the Ethernet traffic is stripped out of the SONET frame and, if desired, interfaced with a larger aggregation switch (Cisco Catalyst 6500 Series) or Internet router (Cisco 12400 Series or Cisco 10720).

Figure 2
Architecture for Cisco ONS 15327 Using the Cisco Catalyst 3550 Series



Ethernet rate limiting to individual customers

The Cisco ONS 15327 can team up with the Cisco Catalyst 3550 Series to provide an effective rate-limiting solution. The Cisco Catalyst 3550 Series has an excellent port feature (Committed Information Rate functionality) that allows bandwidth to be guaranteed in increments as low as 8 Kbps by rate limiting based on source or destination IP address, source or destination Media Access Control (MAC) address, or Layer 4 Transmission Control Protocol (TCP) or User Datagram Protocol (UDP) information.

To regulate the bandwidth per customer (as indicated in Figure 1), the Cisco Catalyst 3550 Series is placed at the customer premises with the Cisco ONS 15327. This way, the service provider can dedicate whatever amount of metro traffic is needed to the Cisco ONS 15327 and still have the control to allocate, for example, 15 Mbps to customer 1, 35 Mbps to customer 2, and 30 Mbps to customer 3.

Additional Features of Cisco Catalyst 3550 Series SMI Software Releases

In addition to the ability to rate-limit bandwidth, the Cisco Catalyst 3550 Series provides robust QoS, security, Layer 3 routing, and enhanced metro features to meet service providers' various requirements (Table 1).

Table 1

Features of Cisco Catalyst 3550 Series

Version: 12.1(11)EA1		Version: 12.1(9)EA1	
Routing Information Protocol (RIP) Version 1, RIPv2, and static routing	ACLs based on differentiated services code point (DSCP) filtering	802.1Q tunneling (Q-in-Q)	Voice VLAN (auxiliary VLAN)
CISCO-PORT-QOS-MIB	Trusted boundary configuration	4096 VLAN IDs	Port security MAC address aging
Per port, per VLAN, ingress policing	Layer2/Layer3 Interface Management Information Base (MIB)	802.1w	Internet Group Management Protocol (IGMP) filtering
Aggressive Unidirectional Link Detection Protocol (UDLD)	Remote Switched Port Analyzer (RSPAN)	802.1s	802.1x
Web Cache Communication Protocol (WCCP)	Crash information support	Dynamic Host Configuration Protocol (DHCP) option 82	VLAN Trunking Protocol (VTP) pruning
Secure Shell (SSH) Protocol cryptography	Cisco- RTTMONT-MIB	Port-based ACLs	Dynamic access ports
Simple Network Management Protocol (SNMP) Version 3 (cryptography)	Entity MIB	Cisco Networking Services agent (Cisco Intelligence Engine 2100 support)	
SNMPv3 (non-cryptography)	CISCO-PORT-QOS-MIB	64-bit counters on Gigabit Ethernet ports	
Time-based ACLs	Additional frame format support	Coarse wavelength-division multiplexing (CWDM) GBIC support	

Summary

The Cisco ONS 15327 SONET MSPP provides a foundation to build a next-generation optical transport network incorporating innovative features such as 10/100BASE-T and Gigabit Ethernet transport over SONET and has been deployed in many kinds of networks, including service provider, enterprise, government, cable MSO, ISP, and utility provider.

The Cisco ONS 15327 teams up with the Cisco Catalyst 3550 Series to provide the metro transport over the protected SONET network, with the Cisco Catalyst 3550 Series providing enhanced Cisco IOS Software features and rate limiting. The result is an effective carrier-class Ethernet solution.

More Information

For more information about the Cisco Catalyst 3550 Series, visit:

<http://www.cisco.com/en/US/products/hw/switches/ps646/index.html>

For more information about the Cisco ONS 15327 SONET MSPP, visit:

http://www.cisco.com/en/US/products/hw/optical/ps2001/prod_models_home.html

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