Midwestern Service Provider Retools Fiber Optic Network

US Signal upgraded its network to increase bandwidth and offer new converged services.

EXECUTIVE SUMMARY

US SIGNAL

- Data transport service provider to carrier, wholesale and enterprise customers
- Based in Grand Rapids, Michigan

CHALLENGE

- Build out network to support a wider geographic footprint
- Increase bandwidth and flexibility of network
- Flexibly offer converged services to regional carriers, wholesale customers, and enterprises

SOLUTION

- Technologies to expand metro transport network
- Xponder cards to enable virtual Ethernet service
- Platforms in aggregation layer to increase capacity
- Upgrades to expand Ethernet service

RESULTS

- The all-Cisco DWDM and SONET network has made it easier for US Signal to manage and provision services and to integrate new products
- New Xponder cards for the Cisco ONS 15454 MSTP enable a Gigabit Ethernet extension and aggregation over DWDM and IP over DWDM
- The addition of new ES20 line cards for the Cisco 7600 Series routers has simplified the provisioning of VPLS connections across the MPLS backbone and providing native Ethernet Layer 2 and Layer 3 IP/MPLS

Challenge

US Signal offers a broad range of carrier-class telecommunications solutions based on a robust IP Multiprotocol Label Switching (IP/MPLS) network to enterprise, wholesale, and service provider customers, Figure 1. The company offers unlimited high-speed capacity, dark fiber, managed services, and collocation services. A division of US Signal also helps customers to design and build their own networks.

“We know that the applications over the next few years will be increasingly data-centric and will require a lot of bandwidth,” says Dan Olrich, executive vice president of engineering and operations at US Signal. “So we partnered with Cisco to build a DWDM [dense wavelength-division multiplexing] long-haul network to deliver native IP and Ethernet services.”

US Signal also wanted to increase the bandwidth and resiliency of their network and to be able to flexibly offer a variety of low and high rate services, from DS1/T1 to 10-Gigabit Ethernet.

Figure 1. US Signal Network Coverage Area

Solution

Expanding the Metro Transport Network

US Signal expanded its purchase and deployment of the Cisco® ONS 15454 Multiservice Transport Platform (MSTP), the most deployed Metro and regional DWDM solution in the world, featuring the two- through eight-degree Wavelength Cross Connect (WXC) technology and Reconfigurable Optical Add/Drop Multiplexer (ROADM) technology that enables wavelength provisioning across entire networks and eliminates the need for optical-to-electrical-to-optical (OEO) transponder conversions. The ONS 15454 MSTP interconnects with Layer 2, Layer 3, and storage area network (SAN) devices at rates of up to 40 Gbps.

“The Cisco 15454 platform has given us the ability to turn up unprotected wavelength services across our long-haul routes and DWDM infrastructure,” says Roger Baas, US Signal’s director of engineering. “Because of our ring architecture with built-in failover features, we can also offer a premium-priced protected service option. This is a competitive differentiator with other carriers

whose long-haul routes are usually linear and don't have protected paths, so they are more susceptible to going down due to fiber cuts or maintenance activities."

Also, a new multi-mode technology from Cisco allows for routing of DWDM waves between systems without back-to-back transponder equipment, for a cost savings and greater flexibility.

Xponder Cards Enable Virtual Ethernet Service

US Signal additionally became one of the first production deployments of the Cisco ONS 15454 Gigabit Ethernet Xponder cards. The cards enable a Gigabit Ethernet extension and aggregation from the deep Metro networks over DWDM.

The Cisco Xponders have enabled US Signal's Virtual Ethernet Service, where Ethernet Layer 2 services are delivered over the DWDM network to customers using a variety of technologies, including fiber builds, Ethernet over copper, Ethernet over T1 and DS3, Ethernet over SONET, partner Ethernet networks, and direct carrier hotel or collocation hand-offs to the network. The Virtual Ethernet Service is also available with Quality of Service (QoS) for the ability to prioritize critical customer traffic, such as voice and video.

"The ability to mix and match any of the available Ethernet access types in Metro areas and across our entire footprint brings a unique product solution to our customers," says Kirk Dombek, US Signal's director of product management. "The Virtual Ethernet Service reduces the complexity of a customer's network configuration because customer LANs utilize Ethernet technology and can greatly reduce equipment interface costs."

US Signal provides a carrier-class Virtual Ethernet Service for enterprise, wholesale, and carrier customers.

Linking Metro and Long-Haul Networks at the Aggregation Layer

Another product deployed as part of the US Signal network expansion was the Cisco ONS 15600 Multiservice Switching Platform (MSSP). The MSSP 15600 is used as a gateway and in the aggregation layers between the Metro and long-haul parts of the network. The platform allows US Signal to aggregate up to 16 OC192 rings and to switch traffic any-to-any at those rings.

"The MSSP 15600 has greatly increased the capacity that we can handle," says Roger Baas. "The speed of the rings has increased and the ability to create any-to-any connections has really simplified our ability to provision services across the network."

Upgrading Edge Routers for 20 Gbps Ethernet Services

US Signal upgraded the SPA interface processor (SIP) and shared port adapter (SPA) cards on their edge Cisco 7609 Series routers and added new Cisco Ethernet Services 20 Gbps (ES-20) cards that support up to 20 Gbps of bandwidth with 20 ports of Gigabit or two ports of 10-Gigabit Ethernet interfaces. The cards feature hierarchical QoS, locally significant virtual LANs (VLANs), and up to 16 k VLAN IDs per line card. The cards also provide the unique ability to combine both Layer 2 and Layer 3 services on the same line card. The combination of native Ethernet Layer 2 switching, bridging, VPLS, Ethernet over MPLS, and Layer 3 IP/MPLS routing distinguishes the line card among other products on the market.

The ES-20 cards also simplify the aggregation of all Metro Ethernet services and services passing through the Xponders and simplify provisioning VPLS connections across the MPLS backbone.

"The ES-20 cards have allowed us to free up SONET capacity by aggregating that traffic over a native IP Ethernet infrastructure," says Roger Baas. "There is a limit to how far you can scale

Ethernet over SONET typically it is possible in 50-Mbps boundaries. But with Ethernet over IP, we can scale services much more flexibly and apply more granular control of QoS."

Results

Customers are developing a real hunger for IP/MPLS as they begin to appreciate the efficiencies and features possible with the service. US Signal recently deployed MPLS services for an insurance company with 360 branches, delivering any-to-any converged services with QoS and a stringent service level agreement (SLA). Meanwhile, carrier and enterprise customers of US Signal want any-to-any Layer 2 Ethernet services via VLANs to provide VoIP and video and to be able to control their own routing.

"Choosing Cisco for our IP MPLS backbone, we have essentially future-proofed our network," says Brian Jones, US Signal's Senior Network Architect. "It has allowed us to scale in step with the needs of our customers and without requiring forklift upgrades."

PRODUCT LIST

- Cisco ONS 15454 Multiservice Transport Platform (MSTP) 40-CH ROADM, WXC, Transponder, and Xponder modules
- Cisco ONS 15454 Multiservice Provisioning Platform (MSPP) MRC, HD DS3, and CE modules and ML-Series line cards
- Cisco ONS 15600 Multiservice Switching Platform (MSSP) ASAP-CC modules
- Cisco 7600 Series SIP/SPA, and Ethernet Services 20 Gbps (ES20) and WS-X67xx Line Cards
- Cisco ME 3400 Series Ethernet Access Switch
- Cisco Catalyst® 3750 Series Switch

"Now that we've built our core network with Cisco DWDM, we have an almost unlimited source of bandwidth and a great degree of flexibility and control," says Olrich. "Our competitors are building Metro Ethernet rings, but they really have trouble tying together their rings across state lines because they have a plethora of different equipment from different vendors in the core, making it hard to manage, deploy, and scale network services. We have only Cisco end-to-end, enabling us to plan and deploy a lot faster and to avoid problems of incompatibility and support."

For More Information

Cisco ONS 15454 Multiservice Transport Platform (MSTP)
http://www.cisco.com/en/US/products/hw/optical/ps2006/ps5320/index.html

Cisco ONS 15454 MSTP Gigabit Ethernet XPonder card
http://www.cisco.com/en/US/prod/collateral/optical/ps5724/ps2006/product_data_sheet0900aecd805ebef7.html

Cisco ONS 15600 Multiservice Switching Platform (MSSP)
http://www.cisco.com/en/US/prod/collateral/optical/ps5724/ps4533/product_data_sheet0900aecd800f7550.html

Cisco 7600 Series Ethernet Services 20 Gbps (ES20) Line Card
http://www.cisco.com/en/US/prod/collateral/routers/ps368/product_data_sheet0900aecd8057f3ad.html

Cisco Powered Program: http://www.cisco.com/go/cpp

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