The Core Packet-Optical Transport Evolution

EXECUTIVE SUMMARY

Packet-optical transport has been a major trend in optical networking over the past 18 months. New products have emerged that combine WDM transport, ROADM, Sonet/SDH ADMs, and centralized carrier Ethernet switching in a single converged device. Heavy Reading calls these products packet-optical transport systems (P-OTS).

To date, the P-OTS evolution has been all about the metro, but we're now seeing P-OTS move into the core of the network. Part of the reason core P-OTS is emerging now is that the core transport network has largely been ignored for a couple of years while the industry has focused on rebuilding access, metro, and aggregation networks for packets and IP. In reality, growth in Ethernet and IP, Internet data and video, and mobile data and video affect core as well as metro access networks. The migration from Sonet/SDH circuits to packets is not just a metro issue.

While metro networks are moving toward converged transport and switching, the core network today consists primarily of standalone DWDM elements, optical crossconnects, Sonet/SDH ADMs, and overlay carrier Ethernet switched networks. First-generation optical crossconnects, which are widely installed worldwide, pose significant challenges for operators. They are based on Sonet/SDH switching fabrics. They are effective in networks that are primarily Sonet/SDH with some Ethernet, but were not designed for networks that are primarily based on Ethernet and IP. Limited Ethernet functionality has been added to optical crossconnects over time, allowing for Ethernet over Sonet/SDH transport or for a small amount of Ethernet switching. But optical crossconnects remain TDM devices.

The other key shortcoming of optical crossconnect elements is that they never really migrated out of the network core. Metro/regional networks to date have mostly been populated with Sonet/SDH multiplexers and WDM multiplexers based on traditional ring topologies, not mesh topologies. Thus, operational and bandwidth-saving benefits enabled by core mesh networks haven't been extended beyond the core. Also, the benefits of rapid service provisioning have been largely isolated to the core, preventing the emergence of true end-to-end service provisioning.

Today, as operators have begun their transition from TDM to packet networking, they are faced with a hodgepodge of different networks and different types of networks elements. The network backbone/core is populated with specialized long-haul DWDM equipment and separate optical crossconnect elements for switching. These DWDM and optical crossconnect elements interface with core routers that handle the IP layer. Metro networks are populated with specialized metro WDM equipment and multiservice Sonet/SDH equipment. Meanwhile, separate Ethernet switched
networks are also in the metro mix for handling switched Ethernet services. These metro Ethernet networks are overlay networks. Across all of these disparate elements and disparate networks, there is no unified control plane for tying them all together.

The bottom line is that some of problems of the past decade have been solved, as operators are able to offer packet-based services to their customers. However, the solution has resulted in capex and opex levels that simply cannot scale as the network transition shifts from TDM-centric with some packet to packet-centric with some TDM and, ultimately, to all packet networking.

Operators increasingly see core packet-optical transport as the solution to the challenges facing the core evolution. In short, this new class of network element takes many of the functions being put into metro/regional P-OTS (such as WDM, Ethernet, and Sonet/SDH integration) with greater capacity and scale – and with some key differences, such as high-capacity Optical Transport Network (OTN) switching and Automatically Switched Optical Network (ASON)/Generalized MPLS (GMPLS) control plane. Operator requirements for core P-OTS are just emerging, and vendors are just starting to announce projects at the end of 2009. We expect several more product announcements to come in 2010 and 2011.

The Core Packet-Optical Transport Evolution offers a detailed early look into this emerging segment that is poised to have a tremendous impact on core optical networking over the next five years. The report analyzes the market drivers and primary applications for core P-OTS, explores enabling technologies and standards, and offers a new five-year forecast for the P-OTS market.

The report profiles two network operators – BT and Verizon – with very different strategies for packet networking in the core, as well as 11 leading and innovative suppliers in core packet-optical transport and switching, based on exclusive, in-depth interviews.

For a list of technology suppliers analyzed in this report, click here.

The report includes in-depth five-year forecasts covering worldwide optical core networking revenues, broken out by region. Together, the forecasts provide a clear view of how and when network operators will make the transition to P-OTS, and which markets are expected to have the most activity in this emerging technology sector.

Excerpt 1: Core P-OTS & Legacy Revenue, 2009-2014

Note: Legacy = Traditional optical crossconnect and traditional long-haul DWDM transport
Source: Heavy Reading
Report Scope & Structure

The Core Packet-Optical Transport Evolution is structured as follows:

Section I includes a full executive summary and report key findings.

Section II provides a market and vendor overview and describes key core P-OTS applications.

Section III delves into enabling technologies for core P-OTS, including OTN switching, packet switching fabrics, and COE options and standards.

Section IV provides worldwide and regional market forecasts for core P-OTS.

Section V profiles two network operators that have very different strategies for their core network migrations. The network operators profiled are BT Group plc and Verizon Communications Inc.

Section VI profiles 11 leading and innovative suppliers in core packet-optical transport and switching, based on exclusive, in-depth interviews.

The report is essential reading for a wide range of industry participants, including the following:

- **Telecom service providers**: How will new developments in core packet-optical transport technologies affect your deployment decisions and ability to compete? How do anticipated migration plans match up with your company’s plan? What factors are most likely to drive— or stall—implementation of P-OTS in carrier core networks? Which suppliers are in the best position to meet your needs for next-generation optical core products?

- **Telecom equipment manufacturers**: How do your product development plans map to those of your competitors in the core packet-optical transport sector? Is your current and anticipated product portfolio in line with projected technology deployments? What impact will various standards have on development and demand for P-OTS technologies?

- **Component and subsystem suppliers**: What is the most likely demand curve scenario for components and subsystems that enable core packet-optical transport? Which equipment suppliers and products are emerging as the early leaders in this sector? Where are the market opportunities for your components and subsystems?

- **Investors**: How will the migration to P-OTS affect the optical networking sector? Which technology providers are likely to emerge as the main suppliers of next-gen core optical products, and when are they most likely to reap those benefits?

The Core Packet-Optical Transport Evolution is published in PDF format.