The Future of Optical Transport Networks: 40G & the Road to 100G

EXECUTIVE SUMMARY

On the surface, the inexorable migration upwards in telecommunications transmission speeds appears to be a smooth and predictable curve – one that has moved neatly up the Sonet/SDH hierarchy from a starting point of 155 Mbit/s to the current 10-Gbit/s standard, with 40-Gbit/s transmission coming in the near future. But this evolution has really come in a series of uneven fits and starts, and with a lot of unexpected turns along the way. It has been anything but easily predictable.

After years of stalling, the telecom industry is finally on the verge of another shift in transmission rates. But again, the migration will be neither easy nor predictable. Network operator demand for higher transmission speeds is here at last – 2007 marked the first real volume deployments of 40G technology in operator DWDM networks. The need to interconnect core routers at 40G is driving the initial demand, along with sheer network capacity exhaust. The commercial uptake of 40G is great news for vendors that have been investing in this technology for nearly a decade, and for the optical industry as a whole.

But even as 40G deployments are finally starting to get off the ground, 100G technology already looms large on the horizon as its replacement. The delayed adoption of 40G, combined with the relative proximity of standardized 100G, is greatly complicating the operator migration from 10G to the next level.

It is against this backdrop of great opportunity and significant uncertainty that Heavy Reading launches its detailed investigation into the next generation of transmission speeds. The Future of Optical Transport Networks: 40G & the Road to 100G delivers the industry's most comprehensive forward-looking analysis of the path to 100G and the role that 40G will play along the way. The report is based on three months of in-depth interviews with major industry players, as well as results of a detailed global survey of network operators’ plans for both their 40G and 100G migrations. More than 100 service provider professionals from around the world participated in the survey.

Network equipment suppliers, component and subsystem suppliers, and network operators all face a variety of issues, questions, and challenges as they move forward. This report investigates the key questions, including the following:

- What is driving the adoption of 40G transmission today?
- What's driving the migration to 100G?
- What are the biggest inhibitors to 100G?
- Which vendors are leading the product/innovation charge for 40G/100G DWDM transport?
• What is the likely timeline for this 100G migration?
• At what cost points can the industry produce 100G products...
• And more importantly, what are operators willing to pay for 100G?
• Given the coming of 100G, what will happen to 40G?
• What are the relevant standards groups for 100G and what are they doing?
• When will the 100G standards most likely arrive?

The findings and analysis in this study are based primarily on a survey of 107 network operators regarding their perceptions and plans for 40G and 100G technologies. The Web-based survey, entitled Heavy Reading’s 40G/100G DWDM Deployment Survey, was conducted during the month of August 2007. Survey results deliver up-to-the-minute insight into how network operators are proceeding with their optical transport upgrades, and how they expect the transition to 40G and 100G technologies to occur.

The following figures highlight key demographic information on survey respondents.

**Excerpt 1: Respondent Breakdown by Service Provider Type**

![Pie chart showing respondent breakdown by service provider type.]

- Incumbent: 44%
- Cable MSO: 15%
- Cellular: 6%
- VOIP: 1%
- Wholesale: 8%
- WiFi: 1%
- International: 3%
- Other: 7%

*Source: Heavy Reading*

**Excerpt 2: Respondent Breakdown by Geographic Region**

![Pie chart showing respondent breakdown by geographic region.]

- U.S.: 37%
- Canada: 8%
- Central/South America: 4%
- Western Europe: 14%
- Asia/Pacific: 12%
- China: 3%
- Middle East: 5%
- Other: 6%
- Central/Eastern Europe: 11%

*Source: Heavy Reading*
Along with data and analysis from the survey, *The Future of Optical Transport Networks: 40G & the Road to 100G* profiles and analyzes the strategies of key equipment suppliers in the 40G/100G DWDM sector. Analysis is based on direct interviews with executives and product managers in each company profiled.

**Report Scope & Structure**

*The Future of Optical Transport Networks: 40G & the Road to 100G* is structured as follows:

**Section I** is an introduction to the report, with complete report key findings.

**Section II** provides a market overview outlining the state of high-speed optical transmission today, including a look at the various standards bodies and vendor forums active in 40G and 100G, as well as the various modulation techniques that are on the table.

**Section III** details the results of Heavy Reading's 40G/100G DWDM Deployment Survey, in which we surveyed 107 network operators from around the world regarding their plans for next-generation transmission.

**Section IV** profiles major optical systems and subsystems suppliers on their products and strategies around both 40G and 100G transmission.

**Appendix A** presents the full text of Heavy Reading's 40G/100G DWDM Deployment Survey.

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

- **Telecom service providers**: How are network operators around the world approaching the migration to 40G and 100G optical systems? How do those migration plans match up with your company's plans? What kinds of factors are most likely to drive — or stall — implementation of 100G in carrier networks? Which suppliers are in the best position to meet your needs for next-generation optical products?

- **Telecom equipment manufacturers**: How do network operator plans for 40G and 100G deployment map to your product development plan? Is your company "timing the market" correctly, or is there a chance that demand for 100G products will materialize before your product portfolio is ready? What types of network operators are likely to be the first movers into the 100G sector, and when are they likely to be ready to make that move? How will demand for 40G products be affected by the timetables for 100G deployment?

- **Component and subsystem suppliers**: What is the most likely demand curve scenario for 100G optical components and subsystems? Which equipment suppliers are emerging as the early leaders in the 100G sector? Where are the market opportunities for your DWDM components and subsystems?

- **Investors**: How will the migration to 40G and 100G technologies affect the optical networking sector? Which technology providers are likely to emerge as the main suppliers of next-gen optical products, and when are they most likely to reap those benefits?

*The Future of Optical Transport Networks: 40G & the Road to 100G* is published in PDF format.