100G Overview and Outlook

Driving business value through collaborative intelligence

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Agenda

- Where are we?
- Lessons from 40G and 10G
- Outlook
If I had a € for every time a service provider said...

“I’d deploy 100G today if I had it.”

...I’d be richer, if no less skeptical.
What will drive deployment pace?

- **Availability**

- **Economics**
  - Alternatives; e.g., light a 10G λ or do a network overbuild
  - Timeframe and scope of business case calculation vs. capex available

- **Investment and Innovation**, for an end-to-end solution
  - Standards, e.g. for client and line optics
  - Merchant and captive chips, modules/MSAs

- **Outlook**
  - Traffic growth, revenue growth, macroeconomic indicators, …

- **Ugliness** (size, power) vs. the desire for **Ubiquity** (operationalizing)

- (sometimes) **You just gotta do it**
100G timeline: From “heroes to hype”...

2007
R&D

- Verizon tested Alcatel-Lucent 100G with live traffic (504km) network Tampa – Miami, FL

2008
Demos

- Ciena demo’d 100G OTN at SC08
- AT&T and NEC demo’d 61 wavelengths @ 114Gbps each
- Verizon tested NSN 100G over 1040km distance
- Comcast tested Nortel 100G prototype – 300km span of live network
- VZ tested Nortel 100G on high PMD fiber
- OpVista demo’d 100G using proprietary DMC technology
- Huawei announced 100G prototype

2009
Trials & first products

- Ciena and NYSE Euronext announced 2010 deployment of 100G
- Neos Networks tested Nortel 100G in live network trial
- Banverket ICT completed live trial of Nortel 100G
- DT and Ericsson completed 100G field trial
- Juniper announced 100GE interface for T1600 router
- Alcatel-Lucent announced 100G interfaces for 7750 SR, 7450 ES, and 1625 LambdaXtreme
- Qwest announced 2010 deployment of ALU 100G network
- Adva demo’d DPSK-3ASK 100G modulation format

2010
Standards, Early adopters

- IEEE 100GE standard approval in June 2010
- NYSE Euronext deployment
- Qwest network-wide deployment

...with lots of “heavy lifting” along the way
40G: Moving to general deployment, resilient to global recession

2008 market: 5009 ports

- NSN: 35%
- Cisco: 20%
- Nortel: 16%
- Fujitsu: 7%
- Ericsson: 7%
- Other: 2%

3Q08-2Q09: 7305 ports

- NSN: 29%
- Cisco: 14%
- Nortel: 19%
- Fujitsu: 4%
- Ericsson: 4%
- Other: 8%

Source: Ovum
Includes transport ports and some router ports, short and long reach.
“Other” vendors include ECI, FiberHome, NEC, Tellabs, Vello (Opvista), Xtera, and ZTE.
Juniper is not included, but has shipped 40G

NSN continues to lead in ports deployed; Huawei coming on strong
The bottom line comparison: Transponder ASP ratios

- Red zone: Heroes, hype, haggling, and headway
- Yellow zone: Economics move in favor of higher-capacity signal
- Green means go: Volume parity is likely to happen.
- Too early to graph 100G curve, but highly likely to improve on 40G’s timeline
  - WDM transponders will benefit from datacom’s use of 40GE/100GE

Source: Ovum
ASP = Average Sales Price
Global 40/100G volume forecast

**DWDM WAN transponder cards:**
CAGR (2008-2014) = 72%

**Ethernet transceivers:**
CAGR (2009-2014) = 240%

Source: Ovum

Notes:
- Figure on left is strictly ON systems transponders, does not include router SR or transponder sales.
- Figure on right is Ethernet transceivers for datacom (aka short reach) applications.
- MSA is multi-source agreement; IA is implementation agreement.

Volume will be critical to lower price; standards, MSAs, IAs will all help
WAN prices/volumes should benefit from IEEE/ITU spec coordination.
100G outlook and 10G/40G lessons learned

- Overall market health (or lack of health) can drastically affect the pace of innovation and deployments
  - Venture capital firms’ telecoms investment trend is worrying
  - More technology options aren’t necessarily better
- First to market doesn’t guarantee market leadership, volume does
- Components can and will be critical path
- Operationalizing a technology can take years
- Product flexibility is critical, e.g. mixing waves in a shelf, in a span
- 100G *interest* is clear, but deployments will depend—a lot—on comparative port ASPs
- Datacom is the volume market for 100GE and 40GE through 2014
THANK YOU

For more information about Ovum Telecoms, please contact us at info@ovum.com