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2014 Equipment Design Trends

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LIGHTWAVE

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Today's speaker and agenda

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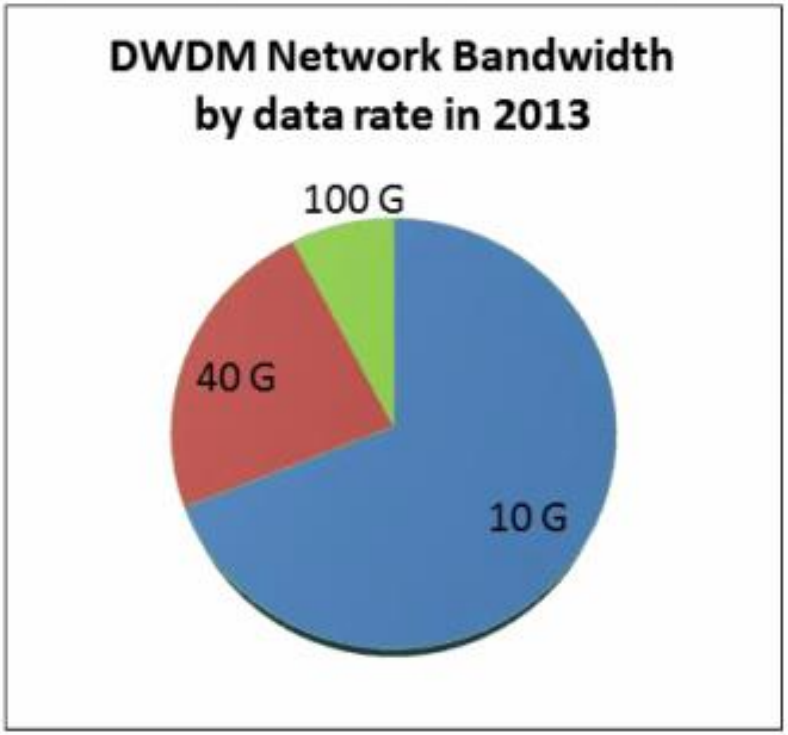
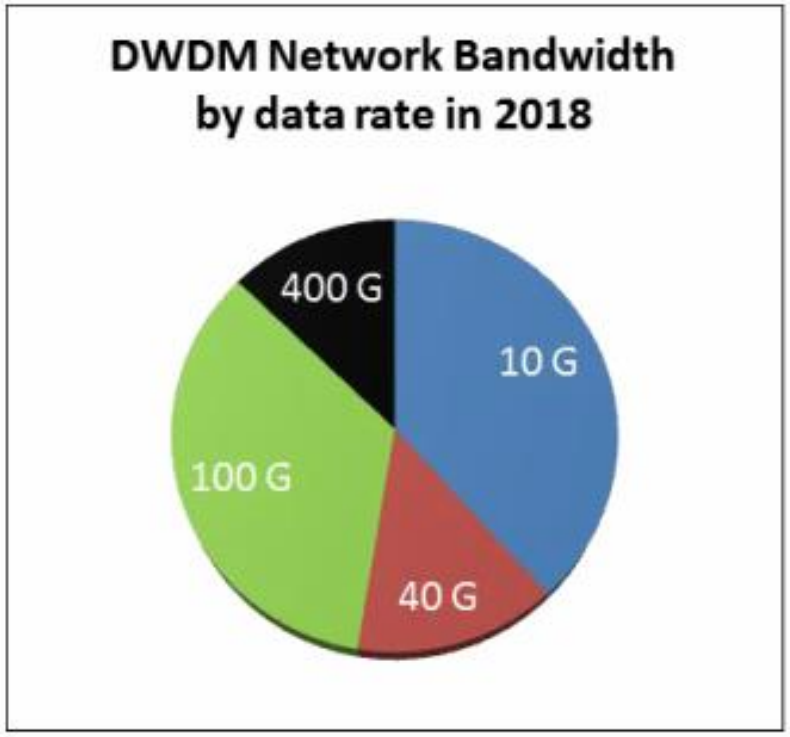
- Systems-level activity for carrier networks
- Systems-level activity for data centers
- Ramifications for enabling technologies
- A look ahead to OFC/NFOEC 2014
- Summary

100G is a long-term trend

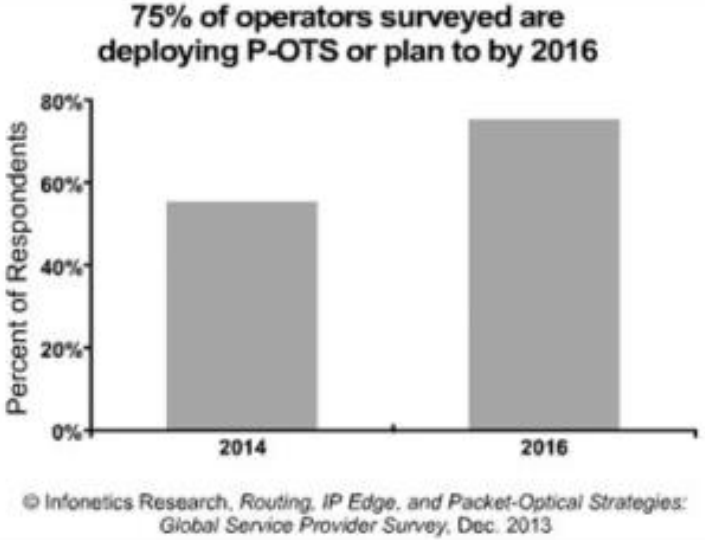




Source: LightCounting Market Research

P-OTS are tops

- Converged packet-optical transport systems (P-OTS) will continue to grow in popularity
  - Represented >50% of the optical hardware market in 2Q13 and 3Q12, says Ovum
  - OTN switching will be a popular feature



© Infonetics Research, *Routing, IP Edge, and Packet-Optical Strategies: Global Service Provider Survey*, Dec. 2013

Increasing speeds

- Looking at 100G in the metro
  - Some action here already, either via long-haul coherent approaches or (in a few cases) direct detect
  - Key is smaller, more efficient transceivers
  - Also, optimizing performance for metro to reduce cost

Increasing speeds (2)

- Writing the 400G story
  - More demonstrations
  - Some deployments
  - Promote multiple modulation options
- Determining support of 200G
  - How do you do it?
  - How much demand is there for it?

Increasing network resource flexibility

- If you thought you heard too much about software-defined networking (SDN) last year…
  - Should be more concrete implementation cases and approaches this year
  - Early implementers more concerned about the functions enabled than how it's done
  - Likely rolled out on a function-by-function or domain-by-domain basis

Meanwhile, in the data center

- Unlikely to see new class of platforms
- Focus will be on leveraging enabling technologies to reduce cost and footprint
  - At top end, also supporting two-tiered, "leaf and spine" architectures
- More of an emphasis on singlemode fiber
  - Particularly with use of silicon photonics

Elsewhere in the data center…

- Also looking at using fiber in more applications
  - PCIexpress, etc.
  - Intra-system interconnects for high-performance computing

Enabling technologies – Line side

- First, there's the chips
  - Second major generation of coherent DSP devices should spark smaller 100G module designs
  - Where do they come from?
  - For CFP2 and smaller, do they reside on the board or in the module?
  - How big a deal is interoperability?
  - 200G-specific chips?

Line side enablers (2)

- We'll see pluggable 100G coherent transceivers this year.
  - CFPs, as OIF works on CFP2 building block specifications.
  - CFP2 TOSA/ROSA building blocks at last year's OFC
  - CFP2 without onboard chips come first, of course
- May even see some 200G

What about 400G?

- Pieces in place for those with in-house ASICs to deliver 400G
  - Flexible-grid ROADMs all set
- Question now is cost vs. need
- Won't see 400G coherent modules any time soon

Data center enablers

- Again, move to smaller form factors
  - Through CFP2, looking at QSFP28 for 100G
  - 40G remains a viable technology
- Can PSM4 play a role at 100G?
- Onboard optics

How all this will play out at OFC/NFOEC

- Systems houses will tell their 100G in the metro, SDN, and 400G stories
  - With maybe some 200G thrown in
- Integration and integration strategies will be widely discussed
  - Silicon photonics, InP, photonic integrated circuits, etc.
- Lots of new transceivers
- Test and measurement follows accordingly

Summary

- Everyone is working toward the same goal, just taking different paths
  - Integration will be a key strategy
- 100G will continue to be a dominant technology
- SDN application to carrier networks will become clearer
- Move to smaller form factor modules continues
- Innovations come from many directions

It's Time for Questions

You can submit a question using the question tool on your screen.

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Thank you for attending.

More questions? You can contact Stephen directly at:

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