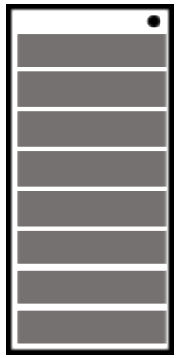
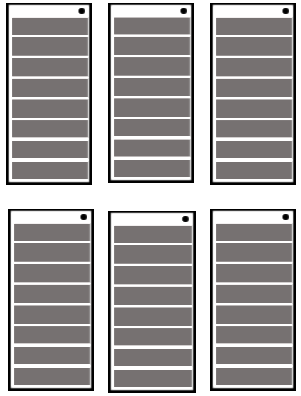
Status of Photonic-Enabled Modules

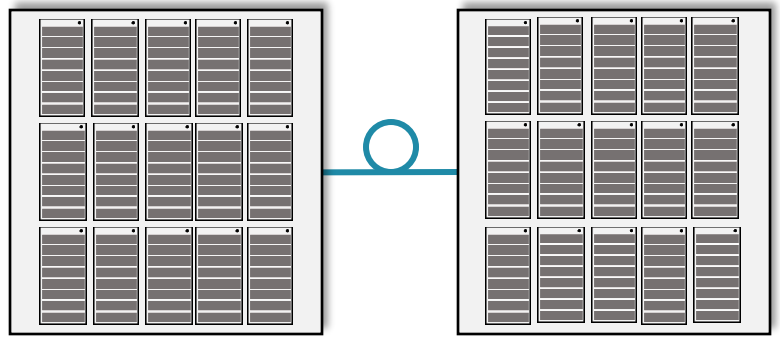
OFC 2025 Executive Forum

Tom Williams

AI Use Cases Driving Investment and Technology Transitions







Scale up

- Power efficient optics to replace copper
- Fast vs wide
- LPO/TRO/CPO
- Liquid cooling

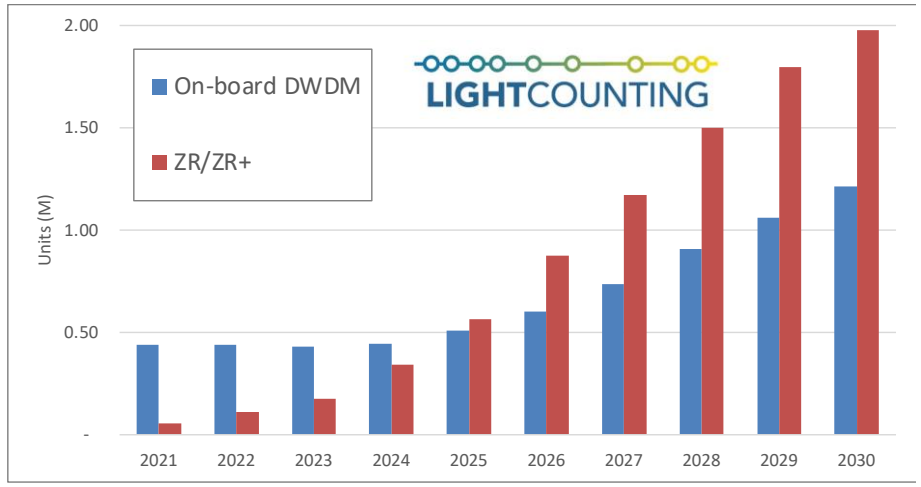
Scale out

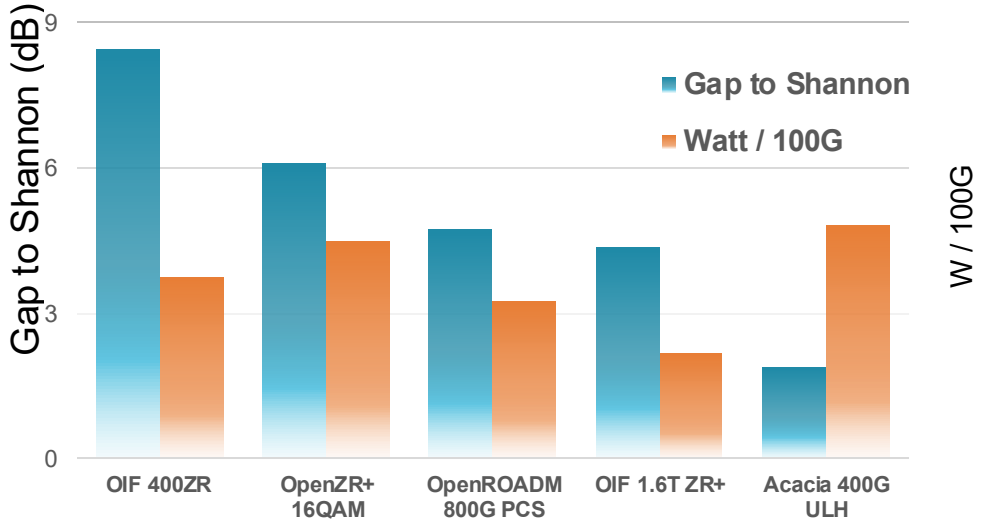
- Optics need to keep pace with increasing silicon scaling
- High BW material systems
  - TFLN, D-EML, SiPh, InP, etc.
  - Scale speed, not cost
- LPO/TRO/CPO

Multi-DC Training

- Driven by datacenter power limitations
- Campus/Regional Distances
  - Pb/s connectivity
- Coherent-lite
- Power optimized coherent

Expanding Use of Pluggable Coherent





- Transport architectures are increasingly adopting pluggable coherent technology
  - 400ZR/ZR+
  - 800ZR/ZR+ in qualification
  - 1600ZR/ZR+ being defined in OIF with end customer urgency
- Adoption of coherent pluggable is expanding to more of the network

- Coherent technology is closing in on the Shannon Limit
- Standardized interfaces are improving with each generation
- Benefits in cost and power continue to drive adoption of coherent pluggables in more of the network

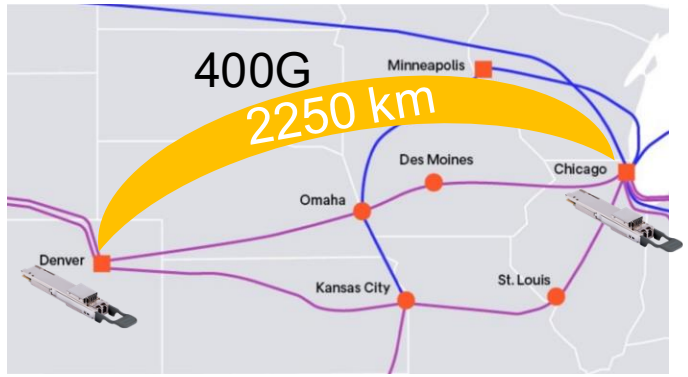
Coherent Pluggables Expanding Network Coverage

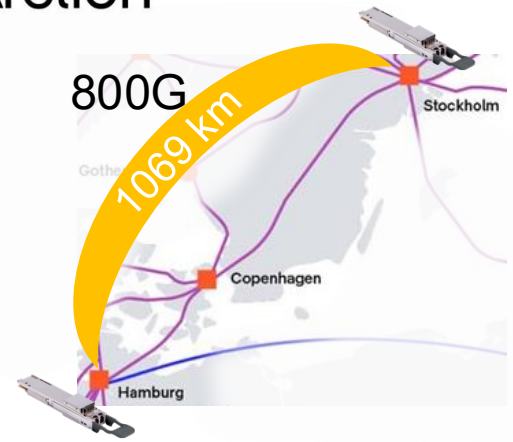
- Customers using 800G technology in new parts of the networks

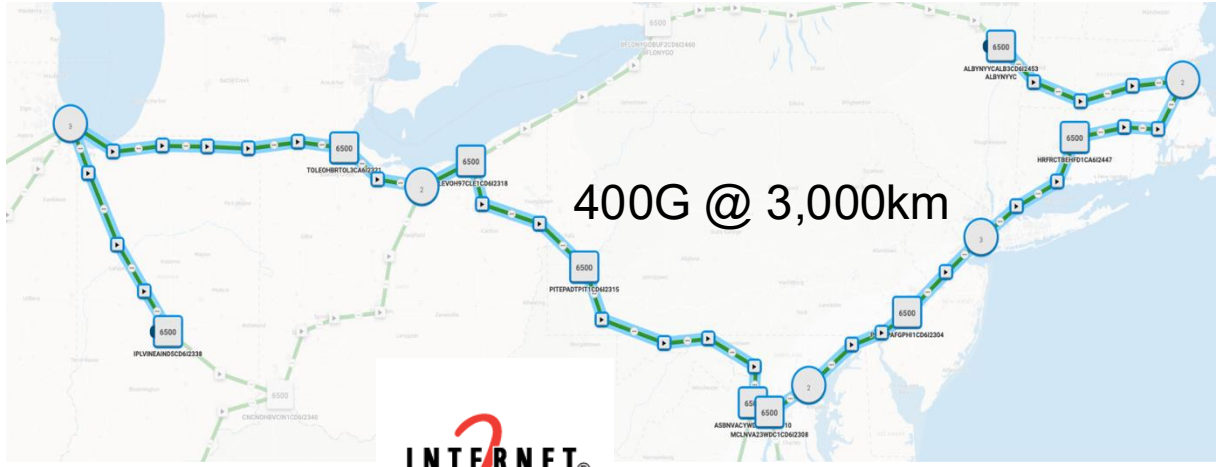
800ZR	800G ZR+	400G ULH
120km	1,000km+	3,000km+

- Interoperable PCS modes, defined by OpenROADM, enable 800G ZR+ with reaches beyond 1,000km
- 400G ULH modes support existing 400G ports and network channel plans

Arelion







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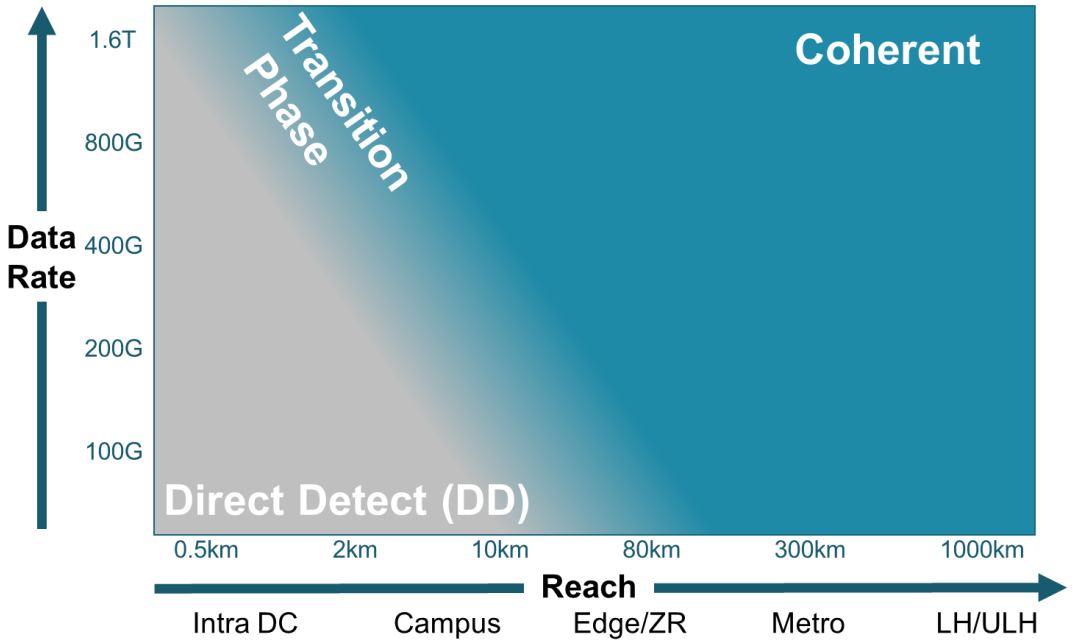
Acacia

Coherent Moving to Shorter Reaches



For similar use case, i.e. 800G LR, coherent power is ~20% higher than IMDD

- Primary motivations to move to coherent are chromatic dispersion and WDM
  - PAM4 chromatic dispersion limited reach reduced by a factor of 4 when baud rate is doubled
- IEEE defining 10km interfaces at 800G for both PAM4 and coherent
- At 1.6T, coherent will be needed beyond a few km
  - PAM4 will support the highest volumes (<2km)
- AI build-outs creating new use cases for coherent-lite, but driving unique requirements
  - OIF has a project to define 1.6T coherent-lite with multiple use cases in scope

Connecting at the speed of light