

CONNECTING AT THE SPEED OF LIGHT

The Road Ahead for Pluggable Coherent Optics ...

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Acacia is now
part of Cisco.



Pluggable coherent transceivers journey so far ...

2014



*Industry's first pluggable coherent
100G CFP module*

2017



100G/200G CFP2-DCO

2020



*400G pluggable module portfolio in
QSFPDD, OSFP and CFP2*

Pay as you
grow

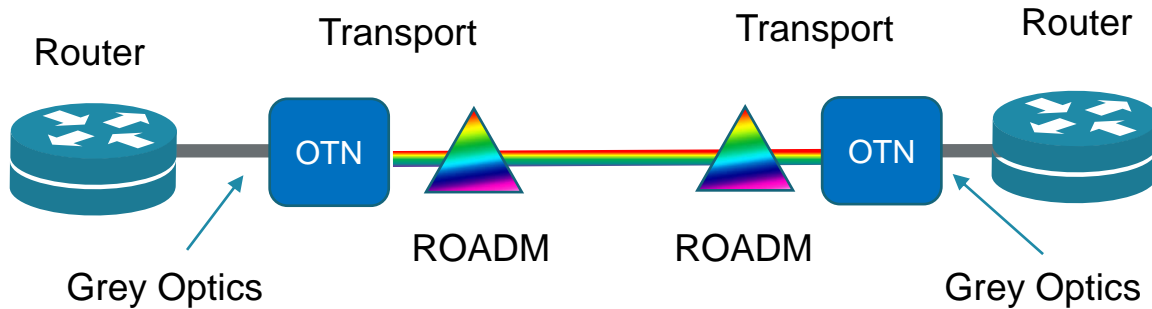
Operational
Simplicity

Power & Space
Optimized

Multi-vendor
interoperability

Vendors have shipped over 1.25+ million coherent pluggable modules so far*

Pluggable coherent optics enable architectures with lower TCO



Conventional Transport Network Architecture

- Grey Optics between router and transport
- Optics is optimized for performance, reach
- High Capex and Opex



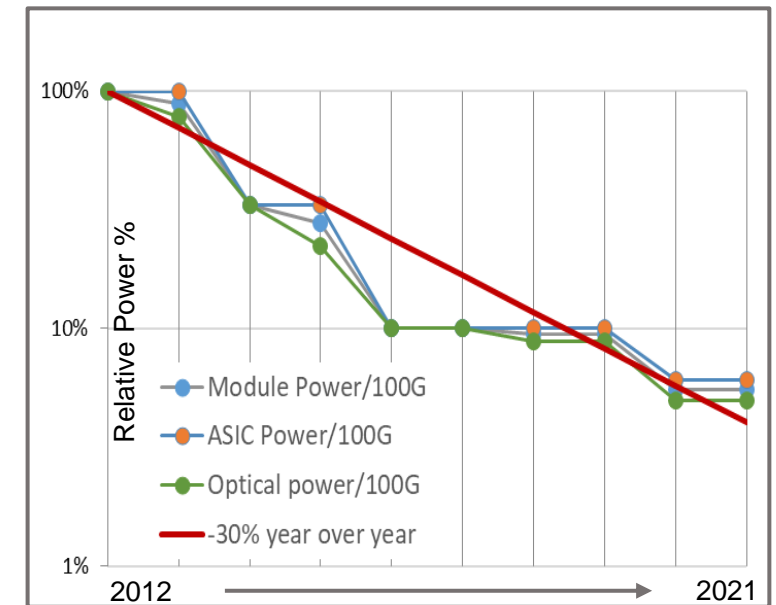
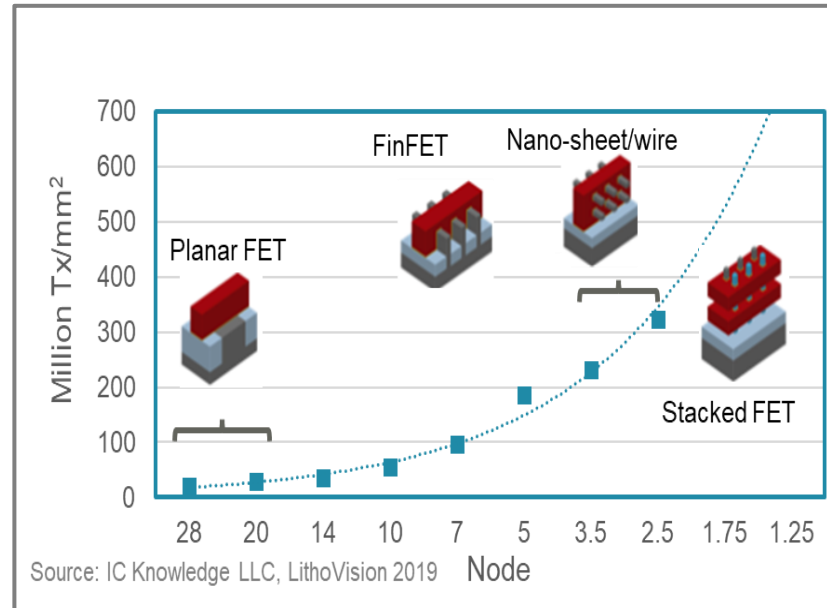
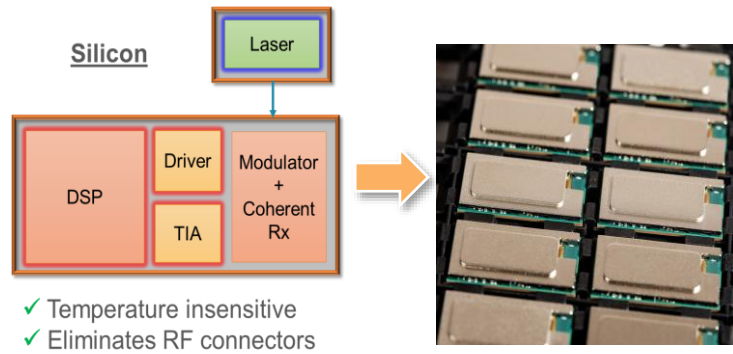
Converged Network Architecture

- Standard DWDM optics directly on router
- Eliminates OEO (high NW efficiency)
- Reduces overall TCO (CapEx and OpEx)

Key Technology Enablers – Integration and Moore's Law

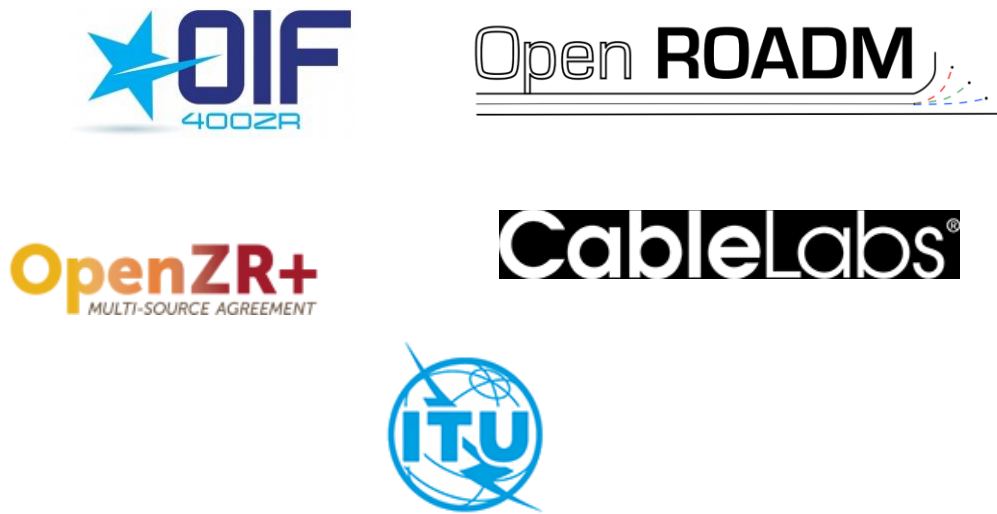
• Advances in packaging technology

- Acacia's 3D Siliconization enables increased scale, automation and reliability
- Improved signal integrity reduces implementation penalties

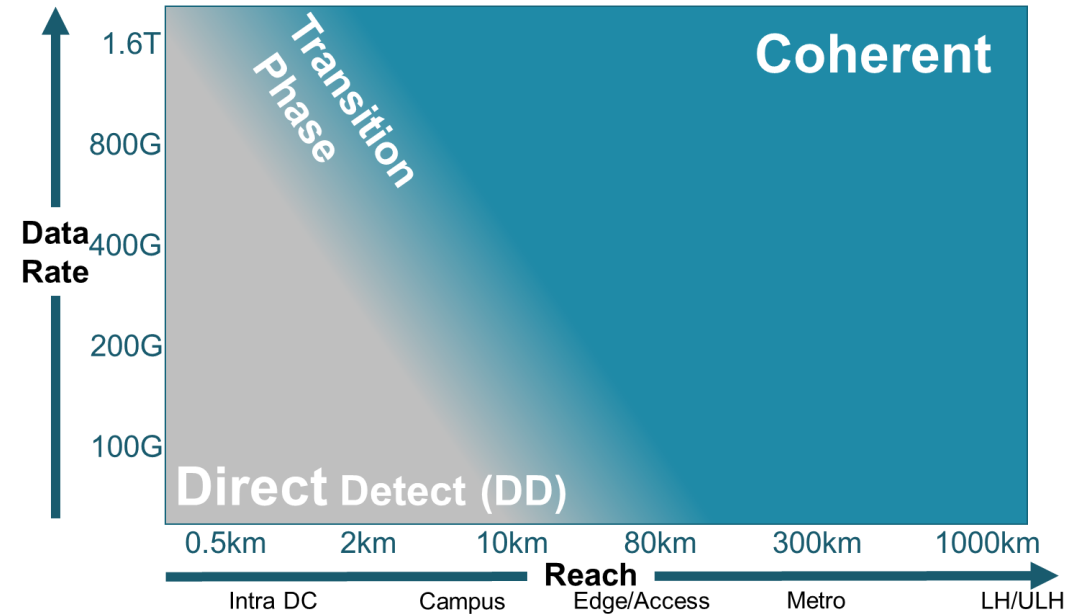


High-performance, reliable, low power consumption, and cost effective

Optical Trends


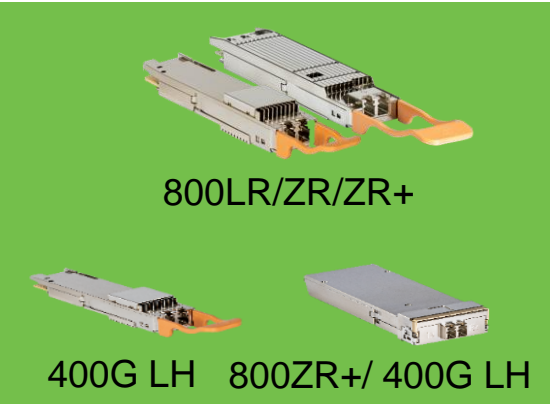

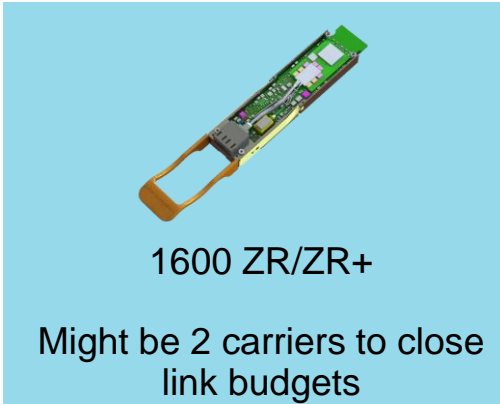


- Coherent Standardization
 - 400ZR/ZR+ and Open ROADM widely adopted
 - 800G coherent standardization in the works !



- Coherent moving to shorter reach applications
 - Higher volume
 - Interoperable
 - Pluggable – same form factor as IMDD

Road ahead for Coherent MSA pluggable

Today		Future	
Expanding applications for 400G pluggables		Next-Gen 800G and 400G LH pluggables	1.6T Coherent for Intra-DC
 <p>400ZR/ZR+/OpenROADM</p> <p>BiDi 400G ER1 Bright 400ZR+</p>		 <p>800LR/ZR/ZR+</p> <p>400G LH 800ZR+/ 400G LH</p>	 <p>1600 DR/FR/LR</p>
1.6T Coherent for DC, carrier networks			
 <p>1600 ZR/ZR+</p> <p>Might be 2 carriers to close link budgets</p>			
50G SerDes		50G/100G SerDes	100G/200G SerDes
16-22W		22-30W	25-30W
7nm CMOS		5nm CMOS	3nm CMOS

High performance multi-haul becoming pluggable

2015



Discrete Implementation
in line card

2018



1.2T Coherent Module

2022



1.2T Multi-haul Coherent
Pluggable Module

28nm CMOS

16nm CMOS

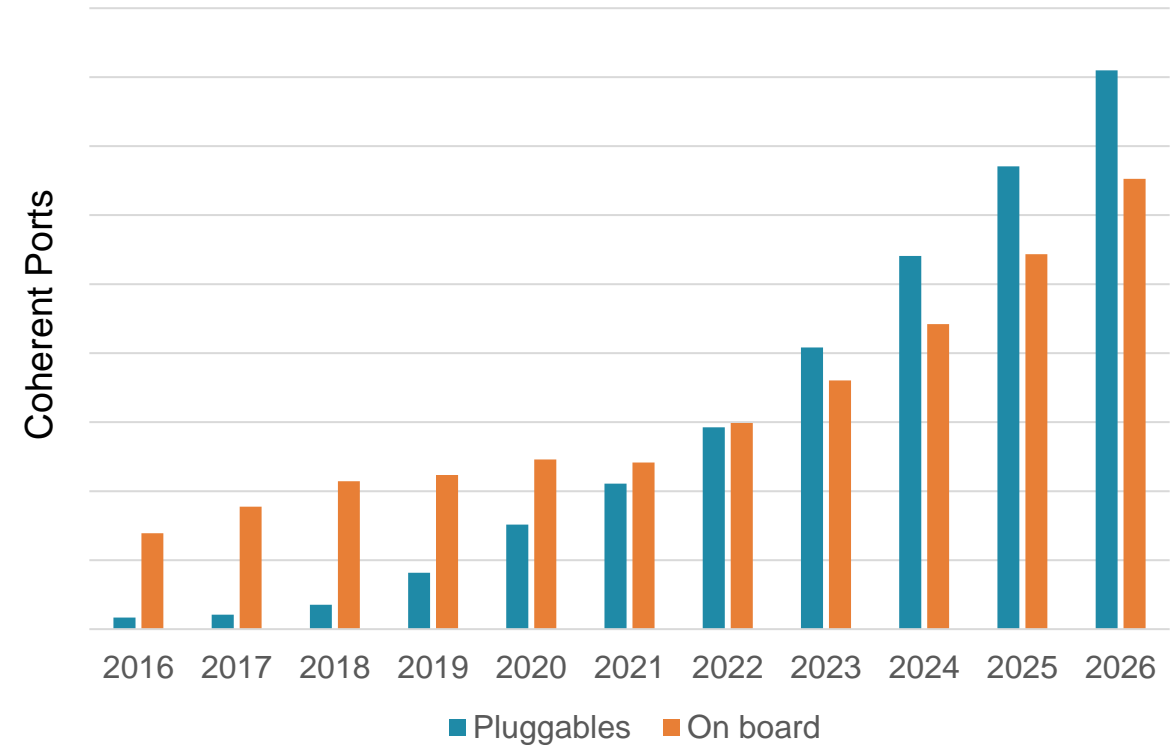
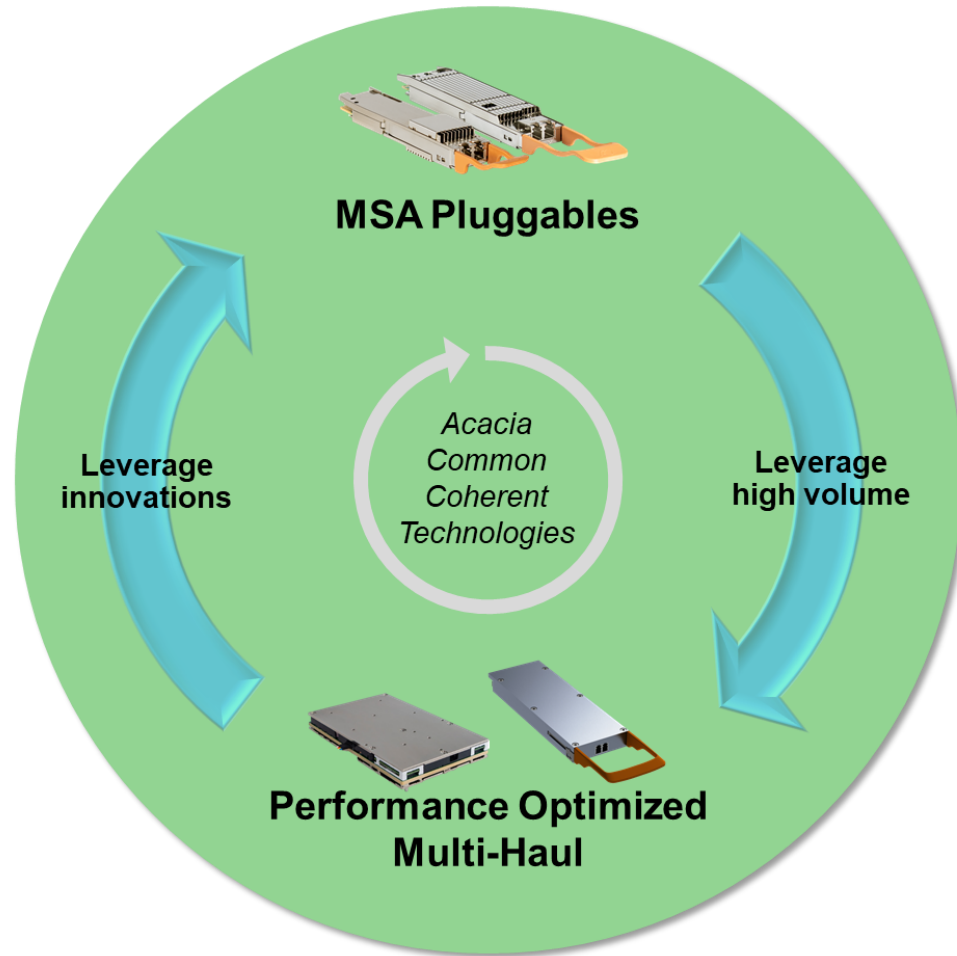
5nm CMOS

30Gbd

70Gbd

140Gbd

Coherent Pluggables – Past is glorious & Future is BRIGHT



Coherent pluggable ports would account more than 55% of the total coherent ports* by 2023

Thank You