



DCI - Accelerating Pluggable Coherent Optics

Open Compute Project

Educational Webinar Series

DCI - Accelerating Pluggable Coherent Optics

Today's Speakers

Cliff Grossner, Ph.D.
VP Market Intelligence
OCP Foundation



Jimmy Yu
VP Research
Dell'Oro Group



Dr. Paul Brooks
Director Product & Technology Support
VIAVI Solutions



Agenda

Data Center Interconnect Market Overview

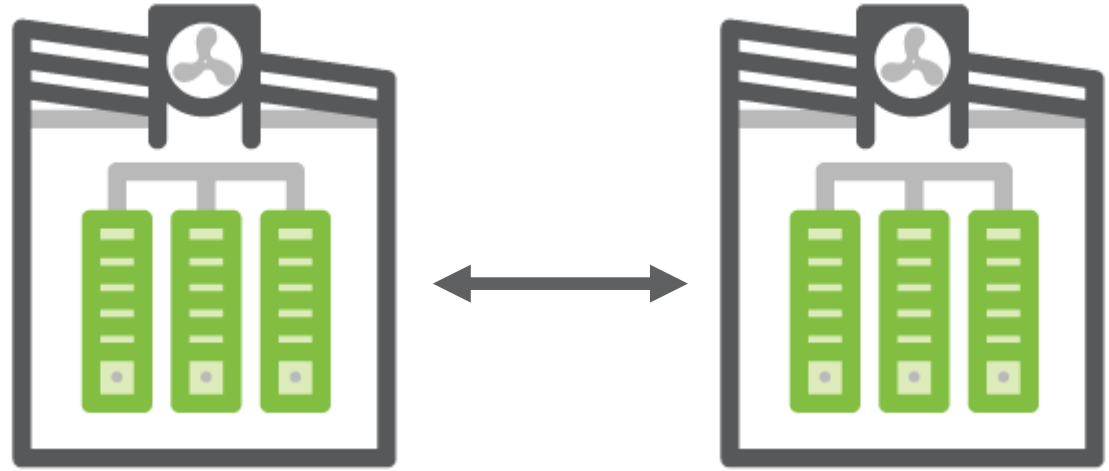
Pluggable Coherent Optics - Enabling DCI

Fireside Chat

Live Q&A

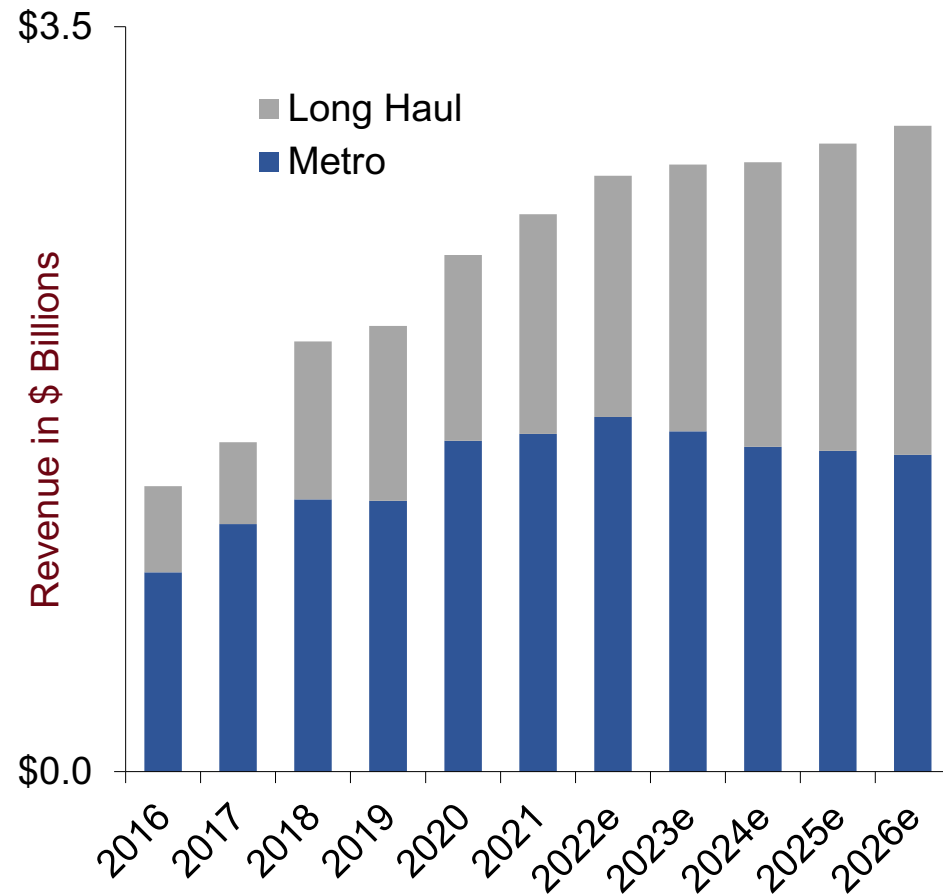
Data Center Interconnect Under Constant Change

- Fast changing market
- Early adopter of technology
 - Coherent wavelengths
- Drive New Architectures
 - Disaggregated DWDM
 - IPoDWDM



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Data Center Interconnect Market – DWDM Systems



DCI drives 18% of Optical WDM Sales

- Direct sales of WDM systems only
- 14% CAGR

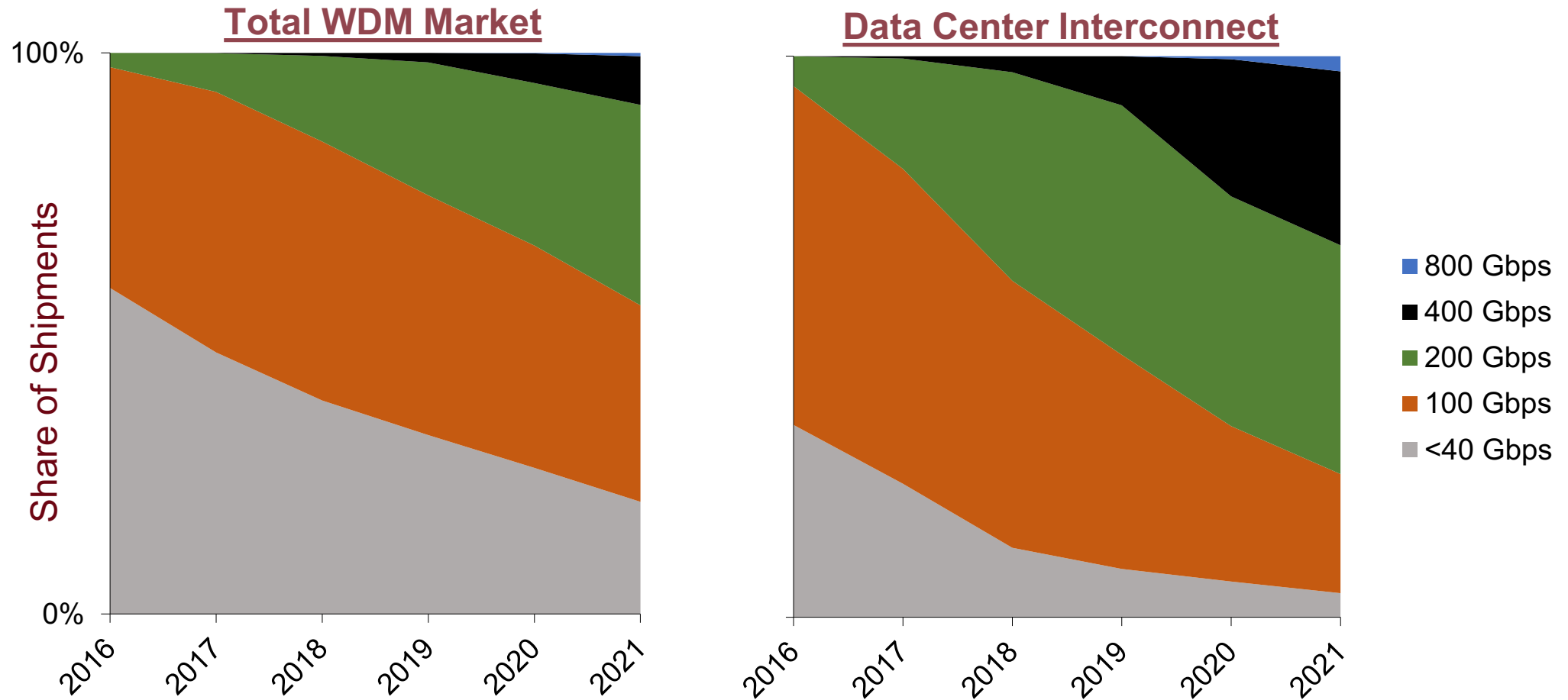
Leads technology adoption before broader market

WDM Metro Systems under pressure

- Forecast lower future demand

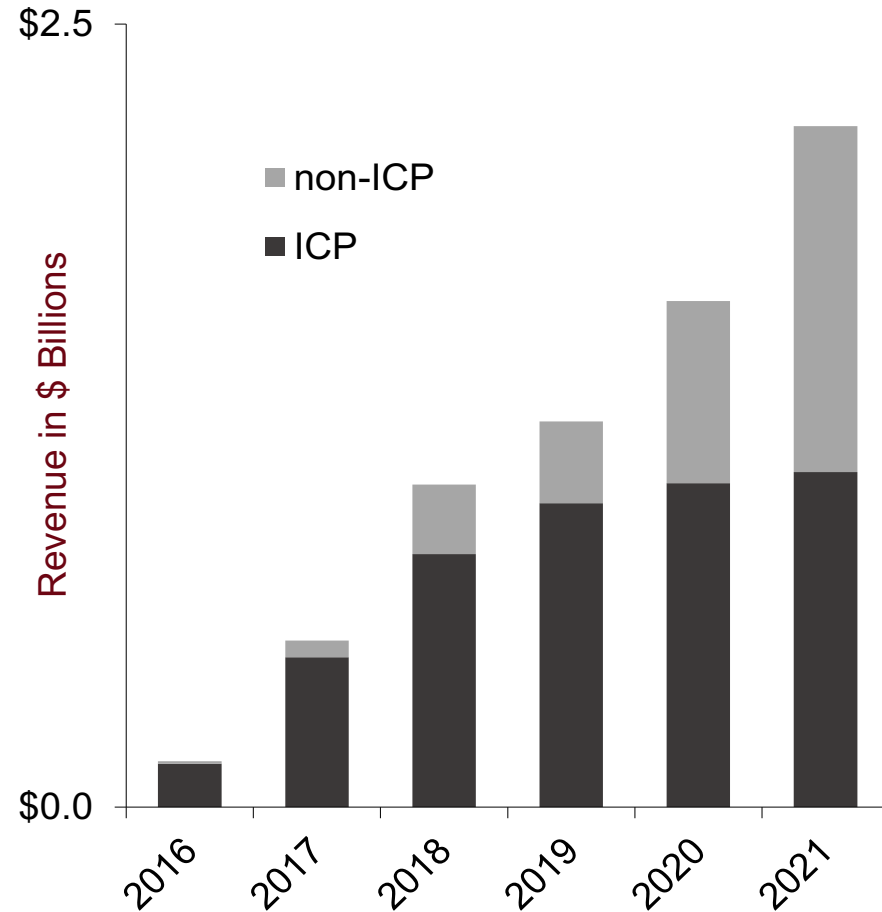
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DCI – Faster Adoption of Higher Speeds



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Disaggregated DWDM – Transponder Unit



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Disaggregated DWDM systems are composed of two hardware pieces

- Transponder unit
- Open line system

Architecture advantage

- Multiple vendors
- Faster shift to better transponders

Usage expanding beyond DCI

- Non-ICP purchases will drive most growth in future

Coherent ZR Optical Pluggable

ZR Optical Pluggable enables IPoDWDM

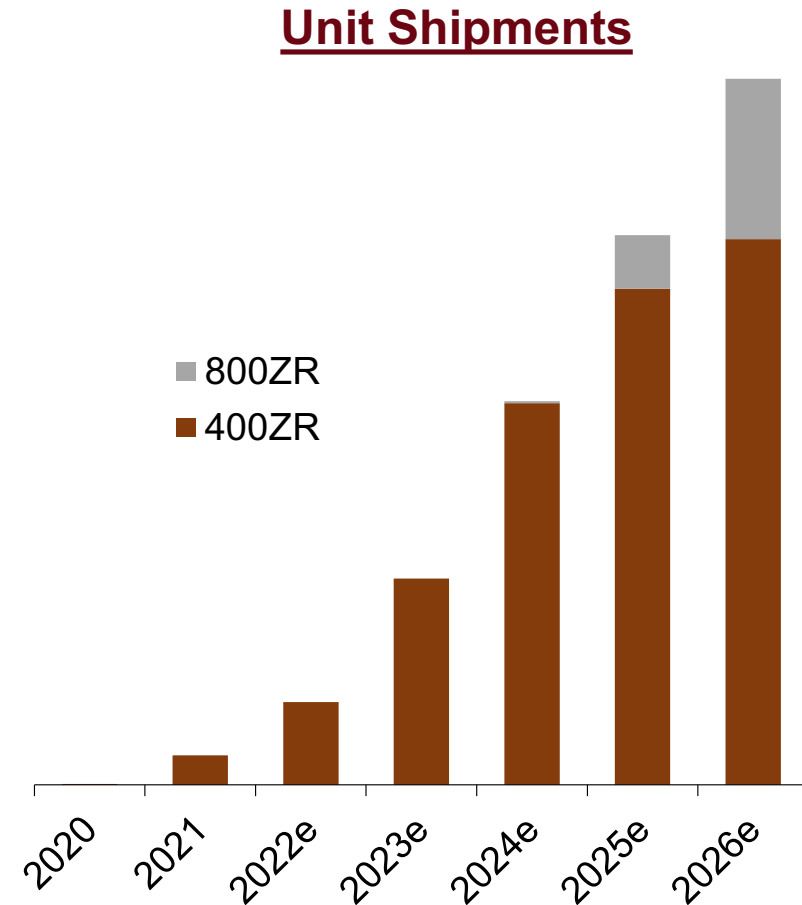
- ICPs expected to be largest purchaser
- CSPs and MSOs also to be large customers

400ZR volumes expected to reach over 250 K by 2026

- Revenue surpass \$450 M

800ZR expected to be available in 2024

- Ramp faster than 400ZR



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WDM Metro Market Forecast

WDM Metro Systems growth shifts down due to ZR optical pluggable

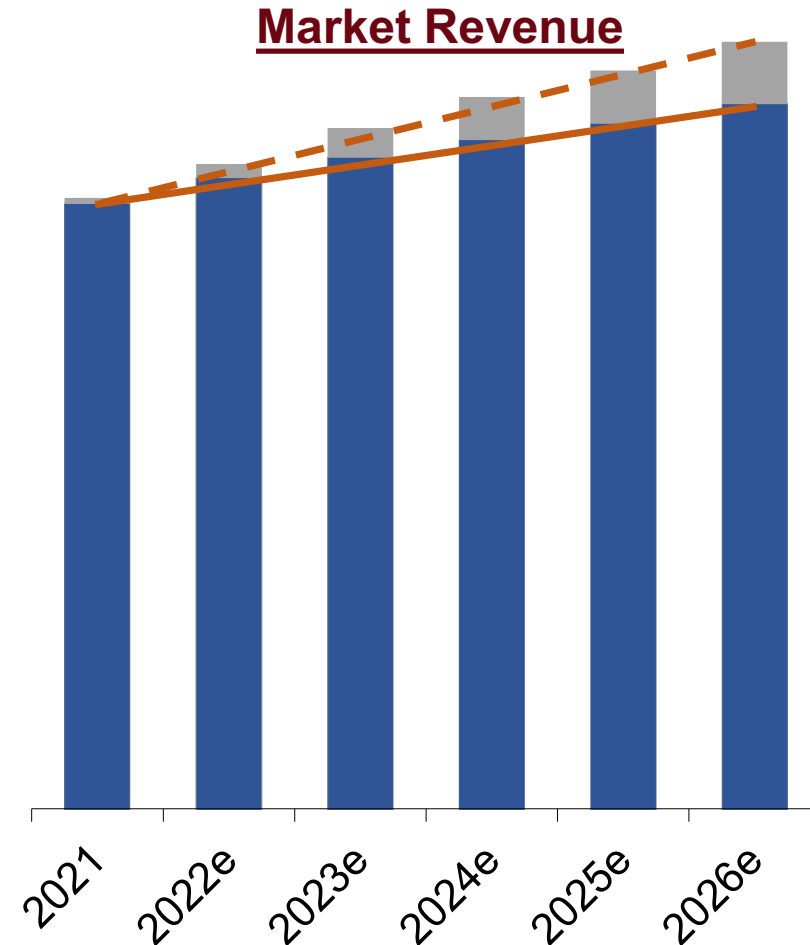
- IPoDWDM
- Lower Price-per-Gbps

5% to 8% of WDM Metro market impacted by 2026

- Fewer transponders
- More optical line systems

Increase network consumption

- Drive need for more capacity in core and long haul



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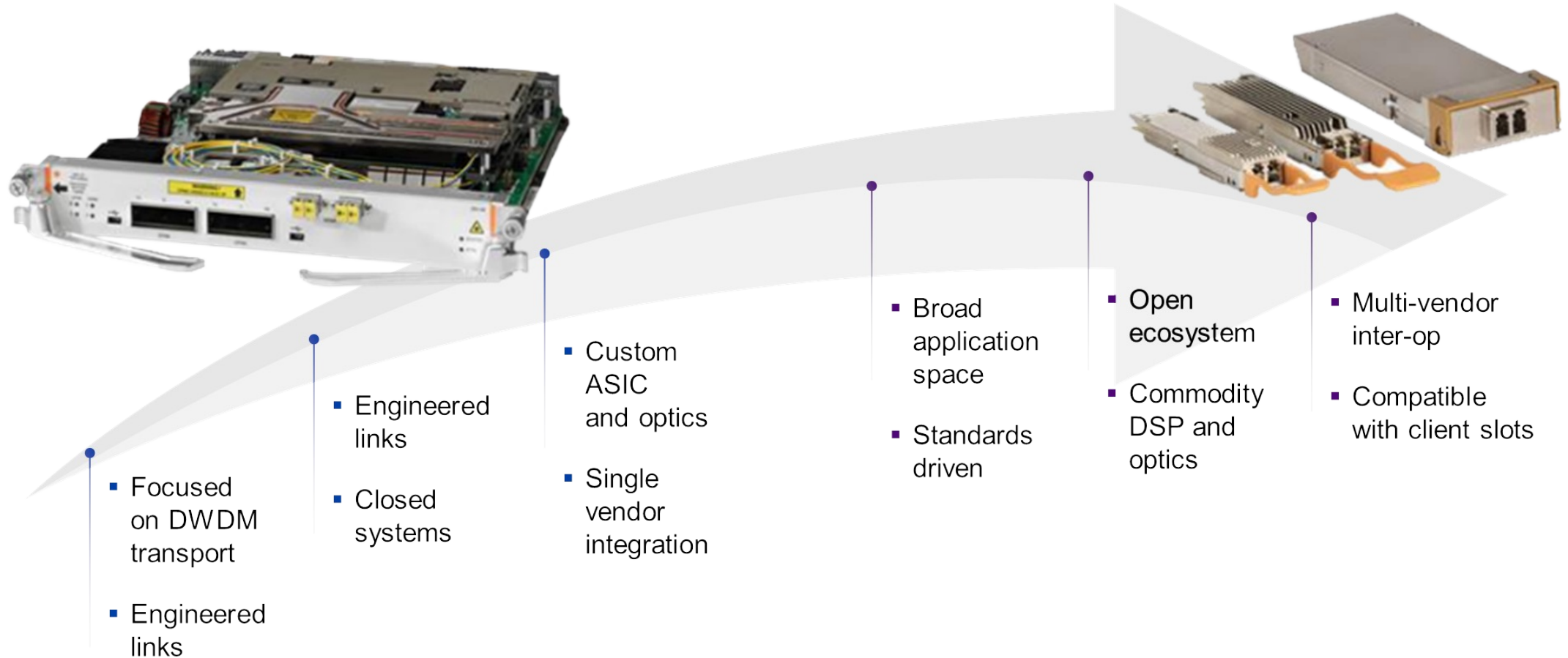
Live Q&A

Introduction

- Data centre interconnect (DCI) is one of the fastest growing segments in the network element ecosystem.
- Multi-vendor pluggable digital coherent optics (DCO) allow standard client module slots to offer the reach (~80 km) required.
- The integration of DCO such as QSFP-DD ZR with a wide range of network elements and ensure the full interoperability in all areas is key to success in the DCI market.
- VIAVI understands the full range of technical challenges associated with DCO integration and interop and through the applications on the industry reference ONT we can help accelerate this process

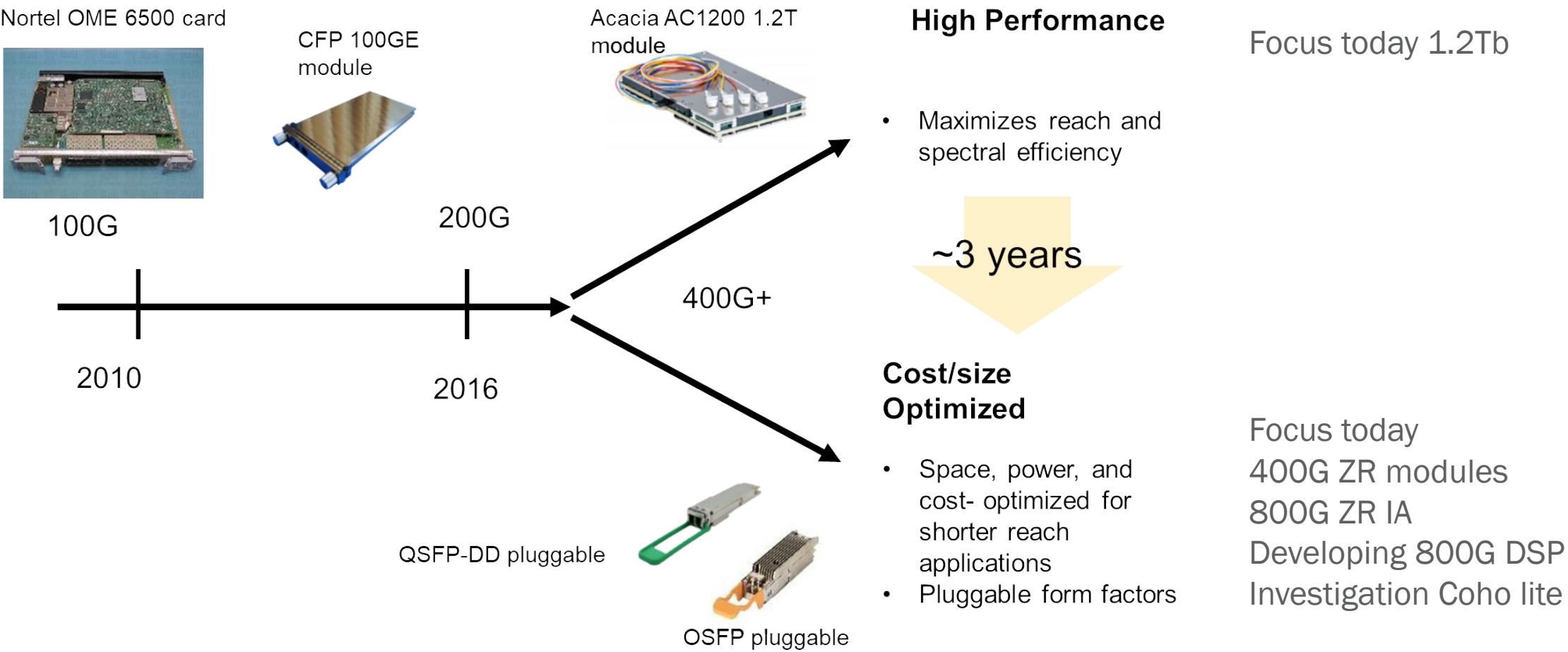
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The Evolution of Coherent Optics



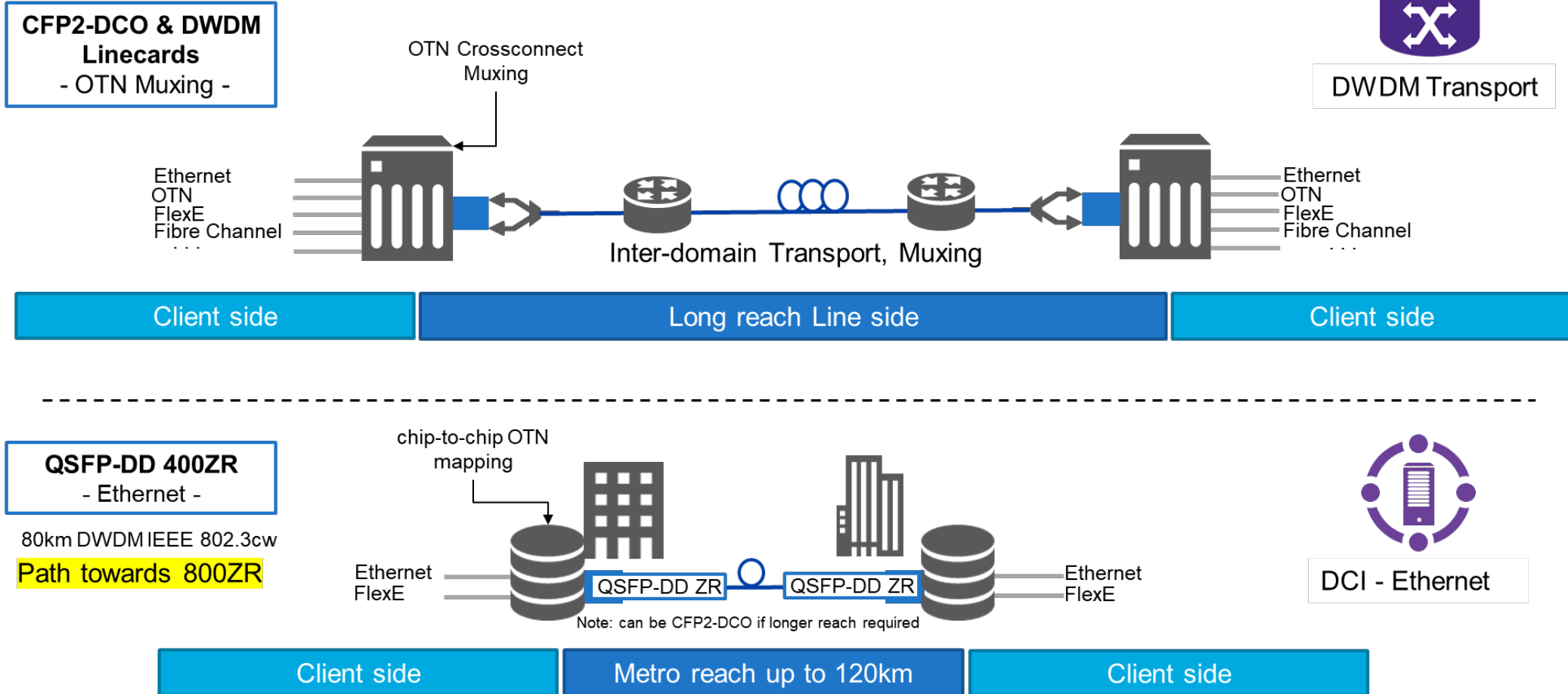
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Coherent Evolution: A Tale of Two Development Tracks



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Transport and DCI



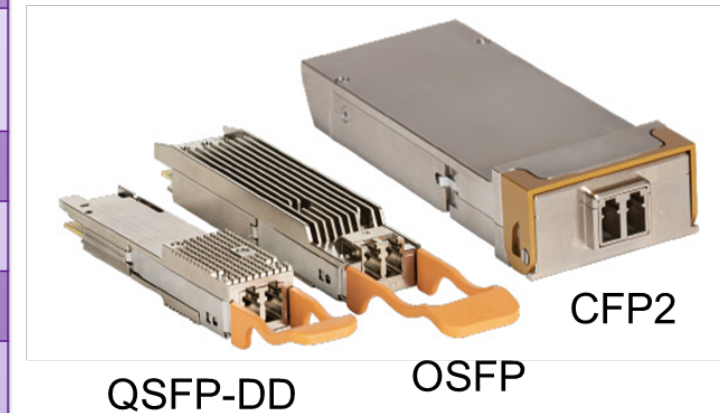
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A Pluggable Market Emerges – but not vanilla

Next generation pluggable coherent module types

	400ZR	OpenROADM	ZR+
Target Application	Edge DCI	Carrier Metro/LH	Regional DCI
Client Traffic	400GE only	100-400GE and OTN	100-400GE multi-rate
Reach	<120km	>120km	>120km
Form Factor	QSFP-DD/OSFP	CFP2 or other	QSFP-DD/OSFP
SD-FEC	CFEC	oFEC	oFEC
Max Power Consumption	15W	No defined	20W
Standards	OIF	OpenROADM MSA	Vendor-driven (to date)

Source: Acacia, 2019



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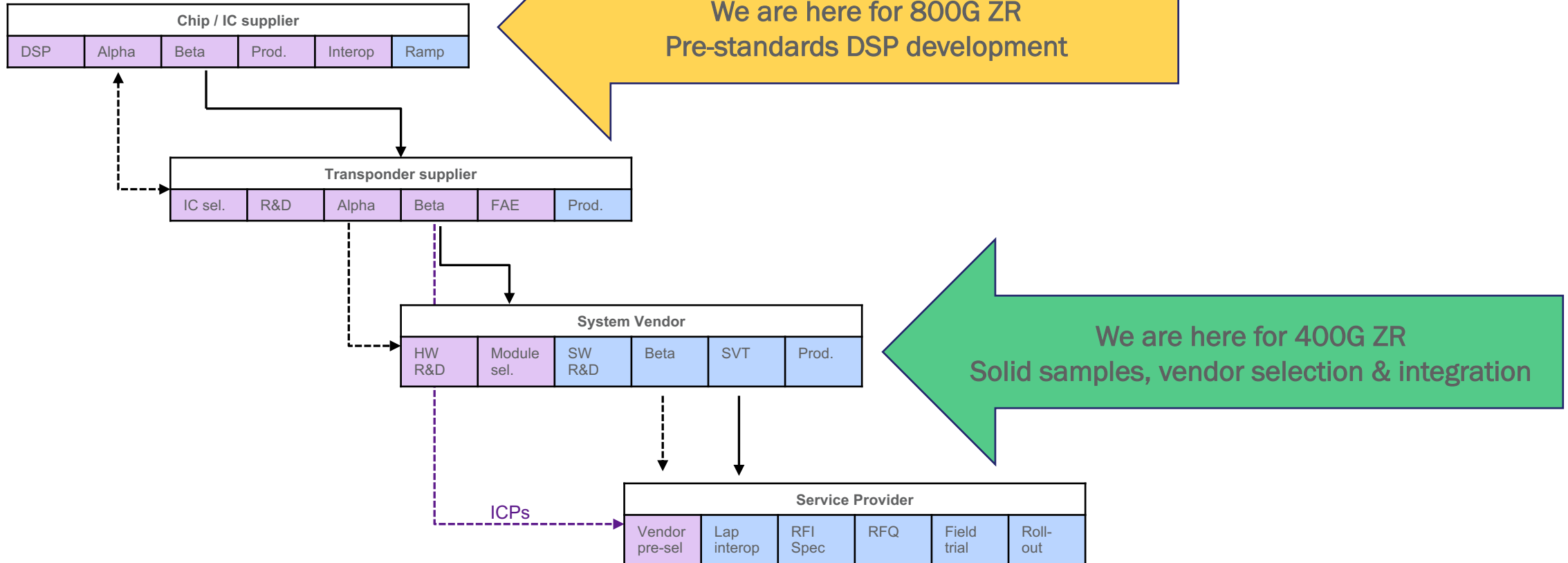
The DCI challenges

- New pluggable coherent optics
 - More complexity, especially host management
 - Demanding thermal & power
 - Integration of network elements & modules more complex
- Interoperability
 - Host/traffic – Ethernet but ‘beyond’ ZR may include OTN & FlexO
 - Performance monitoring & management
 - Photonic interop

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The DCI ecosystem

Chips to modules to systems to end user flow
At each stage T&M plays a key part in accelerating product development.



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DCO Test and Validation

An orchestrated Environment

Pluggable coherent optics (DCO) used for DCI must inter-operate in three domains.

Photonic domain

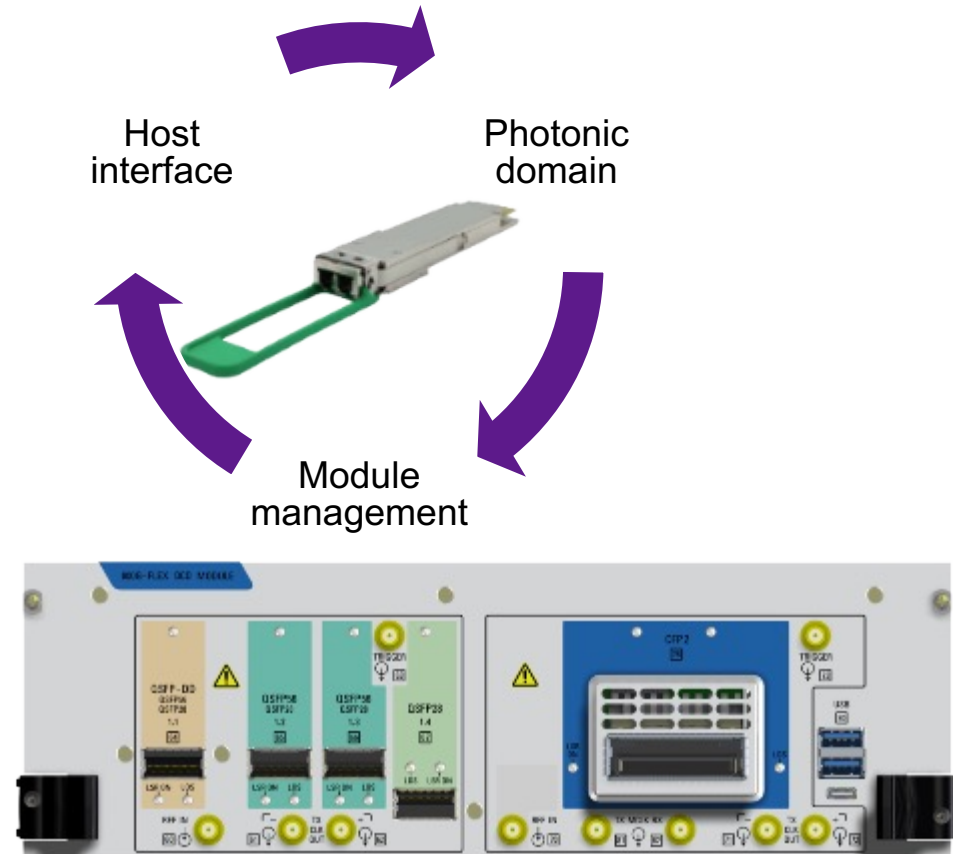
modules must interoperate photonically and all photonic parameters must be correctly managed and reported to the host via the control interface.

Host electrical interface

High speed PAM-4 based electrical interfaces with complex DSP based equalization

Module management & control

Coherent modules are far more complex and require tight firmware control to allow module management.



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Summary Remarks

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30 DISTINCT MARKET
SEGMENTS

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VIAVI empowers Service Providers and IT organizations to manage data centers and the network lifecycle for complex 5G and Fiber networks with intuitive instruments, systems and technologies.

OPTICAL SECURITY & PERFORMANCE

Our expertise in light management and optical coatings help protect the world's bank notes from counterfeiters, bring amazing colors to our life, and enable advanced technology such as 3D sensing.

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INSTRUMENTS IN USE
AROUND THE WORLD



\$1.2B
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(FY21)



100,000
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RELY ON VIAVI



3600+
EMPLOYEES



200+
SERVICE PROVIDER
NETWORKS



350+
CHANNEL
PARTNERS



2359
PATENTS
ISSUED



50
GLOBAL
OFFICES

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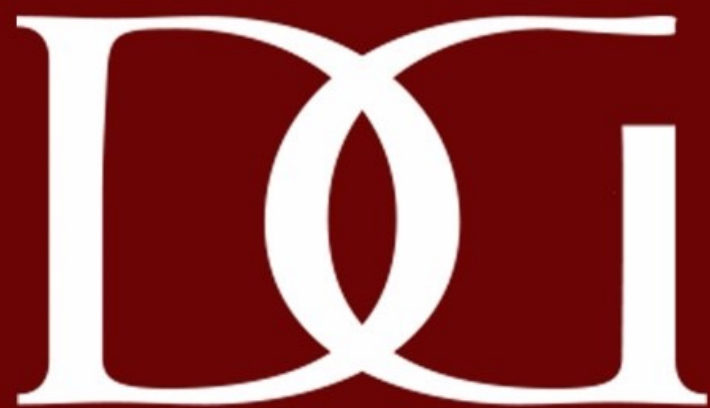


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Thank You

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