



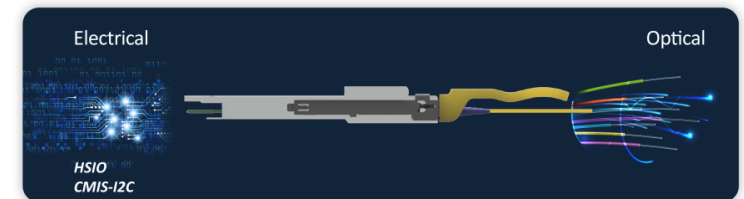
CMIS Interoperability Demo

ECOC 2023



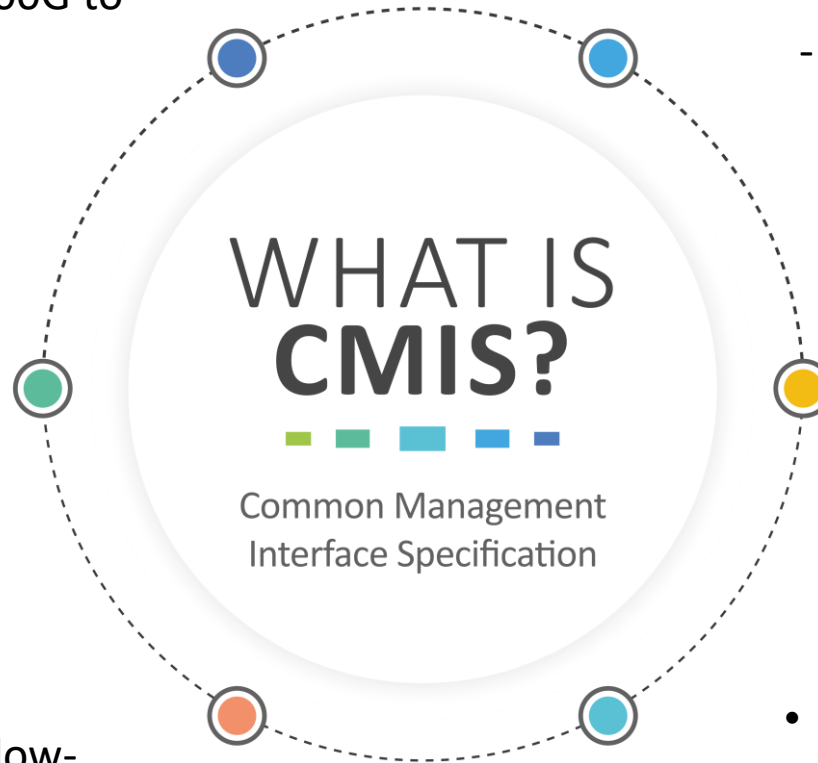
Why was CMIS started?

- CMIS was originally conceived to address industry pain points in module management :
 - Management of multiple form factors
 - Module initialization variability
 - Breakout – managing multiple different services (ie SFF-8024 codes)
- The industry has embraced CMIS leading to continued efforts to evolve CMIS with the addition of support for:
 - Co-packaging / ELSFP
 - Next gen modules based on 112G/224G
 - Link Training



Eliminating Complexity for Pluggable Modules

- Module speeds ranging from 100G to 800G. Unites a wide range of transceiver classes under one management protocol
- Fully form factor agnostic: CMIS implementation is consistent and interchangeable between QSFP-DD, OSFP, QSFP, SFP-DD, SFP, CPO and ELSFP families of modules and more.
 - CMIS gives access to the low-speed I2C interface to control and program the module.



- Supports module types ranging from:
 - Active Cable Assemblies
 - Optical Transceivers
 - Coherent DWDM modules
- Provides communication between all compliant optical modules, switches, and server Network Interface Cards
- Enables interoperability between module and host and is used to test and debug the module

CMIS Demo Overview

- 2 switch/router vendors (Cisco, Juniper)
- 4 test equipment vendors (EXFO, MultiLane, Viavi, Wilder)
- 10 module suppliers (Amphenol, Ciena, Cisco, Coherent, Infinera, Juniper, Lumentum, O-Net, Precision Optical Technologies, Source Photonics)
- 8 interface reaches ranging from passive copper to 400G coherent (DAC, AEC, AOC, DR4, FR4, LR4, 400ZR, 400ZR+)

One common management platform - CMIS

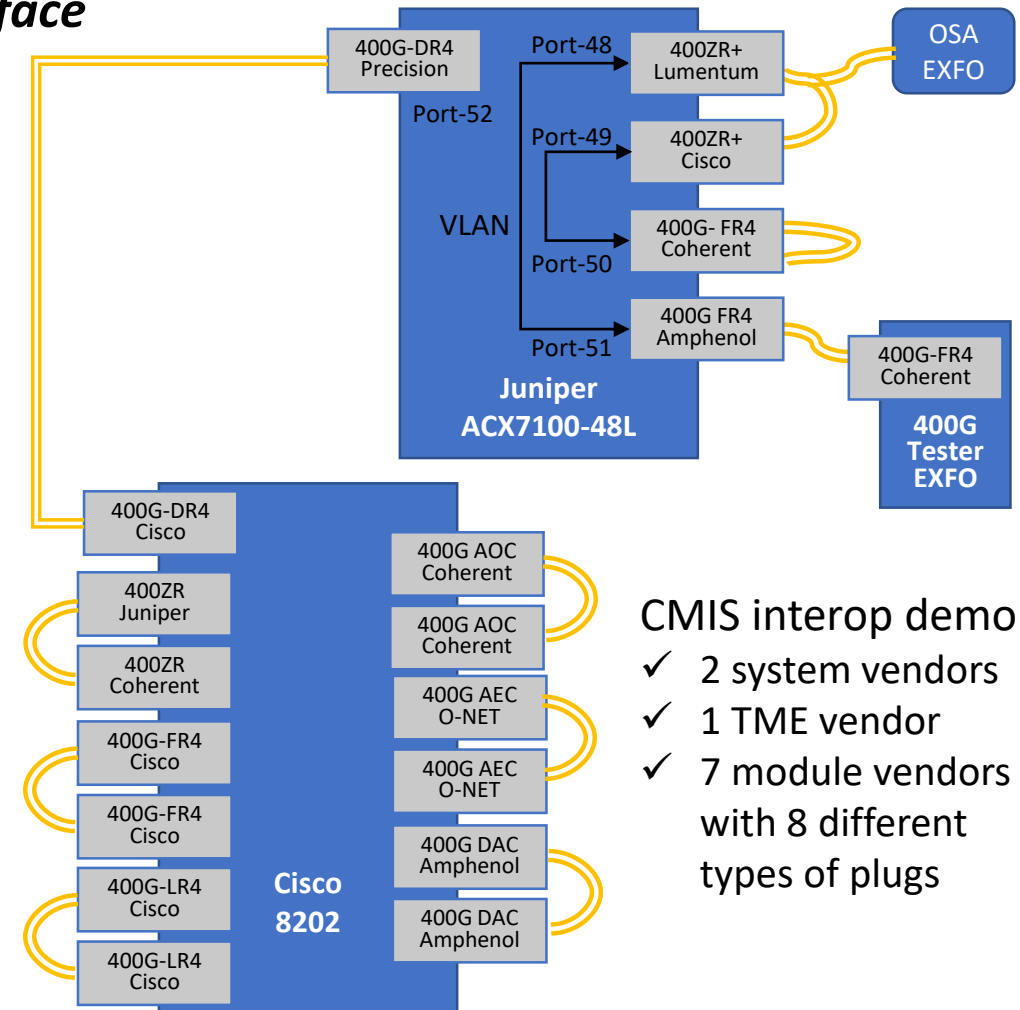
Demo A - Multi-vendor interop. through (CMIS)

❑ **Multi-vendor interop. through Common Management Interface Specification (CMIS)**

❑ Routers/pluggables/TMEs under common management

❑ Demo content:

- CMIS standard application advertisement & selection
 - 400ZR+ plugs interop
 - *Active operating mode switching through CMIS (AppSel)*
 - 400GbE (60Gb/s) vs. 100GbE (30Gb/s)
 - OSA reports spectral shape changes, channel, and Tx launch power
 - Network traffic tester reports traffic loss when switched to 100Gb
- CMIS standard DWDM optics control features:
 - **CMIS Channel selection**
 - **CMIS Tx output power adjustment**
- CMIS standard module bring-up sequences (**MSM/DPSM**)
 - Module state machine
 - Datapath state machine
- **CMIS VDMs** for performance monitoring



CMIS interop demo:

- ✓ 2 system vendors
- ✓ 1 TME vendor
- ✓ 7 module vendors with 8 different types of plugs

CMIS Application advertisement / Selection - AppSel

General / New dashboard

PanelA 48 PanelB 48 PanelC 48 PanelD 48 Wavelength 1547.72 TxPower -10

Juniper ACX7100-48L

Panel A Port Selection

PanelA 48

Panel B Port Selection

PanelB 48

400G 100G

Active Channel

193.70 THz
1547.72 nm

Link Status

UP

Advertised Applications

AppSel	Host Intf Code	Media Intf Code
1	400GAUI-8 C2M (Annex 120E)	ZR-400-OFEC-16QAM
2	400GAUI-8 C2M (Annex 120E)	400ZR, DWDM, amplified
3	100GAUI-2 C2M (Annex 135G)	ZR-400-OFEC-16QAM
4	100GAUI-2 C2M (Annex 135G)	ZR-300-OFEC-8QAM
5	100GAUI-2 C2M (Annex 135G)	ZR-200-OFEC-QPSK
6	100GAUI-2 C2M (Annex 135G)	ZR-100-OFEC-QPSK
7		
8		
9		
10		
11		
12		
13		
14		
15		

Advertised Supported Tx Power

Minimum Tx Power Supported: -15.0dBm
Maximum Tx Power Supported: -8.0dBm

Wavelength

Wavelength 1547.72

Apply Wavelength

Apply

Tx Power

Tx Power -10

Apply TX Power

Apply

DPSM

0x44 0x44 0x44 0x44

MSM

ModuleReady

Module_Reset

Reset

Tx Power

-7.97 dBm

Rx Power

-6.8 dBm

Module Temp

59.98 C

PDL

0.4 dB

OSNR

29.5 dB

Chromatic Dispersion

0 ps/nm

CFO

274 MHz

Vendor

Lumentum

CMIS Module Behavior - MSM - DPSM

CMIS performance monitoring - VDMs/DDMs

CMIS DWDM optics control feature:

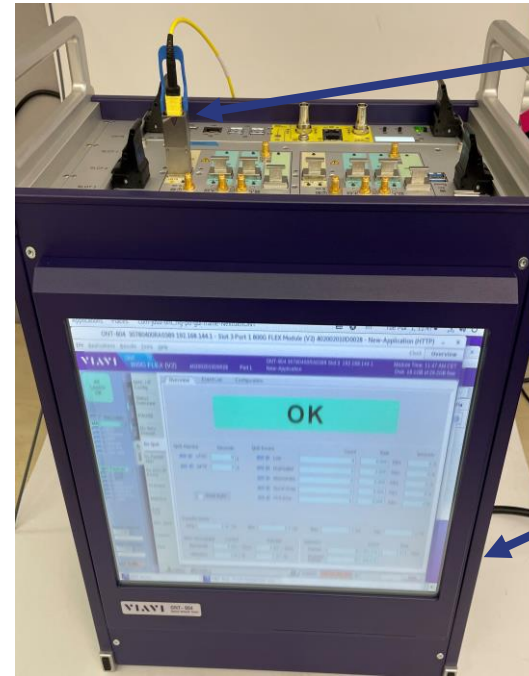
- Channel selection
- Tx launch power control

Demo B - CMIS Appsel

App. Code	Electr. Code [Hex]	Application Name	Host LC	Lane Ass. [Hex]	Media Code [Hex]	Application Name	Media LC
1	0011	400GAUI-8 C2M	8	0001	003E	400ZR, DWDM	1
2	0011	400GAUI-8 C2M	8	0001	003F	400ZR, SW, unampl.	1
3	000D	100GAUI-2 C2M	2	0055	003E	400ZR, DWDM	1
4	0011	400GAUI-8 C2M	8	0001	00C5	Custom	1
5	0011	400GAUI-8 C2M	8	0001	00C0	Custom	1
6	000D	100GAUI-2 C2M	2	0055	00C0	Custom	1
7	000D	100GAUI-2 C2M	2	0055	00C1	Custom	1
8	0011	400GAUI-8 C2M	8	0001	00CE	Custom	1
9	000D	100GAUI-2 C2M	2	0055	00CE	Custom	1
10	000D	100GAUI-2 C2M	2	0055	00CF	Custom	1
11	000D	100GAUI-2 C2M	2	0055	00C2	Custom	1
12	0041	CAUI-4 C2M noFec	4	0011	00C2	Custom	1
13	000D	100GAUI-2 C2M	2	0055	00C4	Custom	1
14	0041	CAUI-4 C2M noFec	4	0011	00C4	Custom	1
15	00FF	End of List	0	0000	0000	Undefined	0

Advertised Module Capabilities

Current CMIS can support 15 app codes, this could be extended in future versions of CMIS



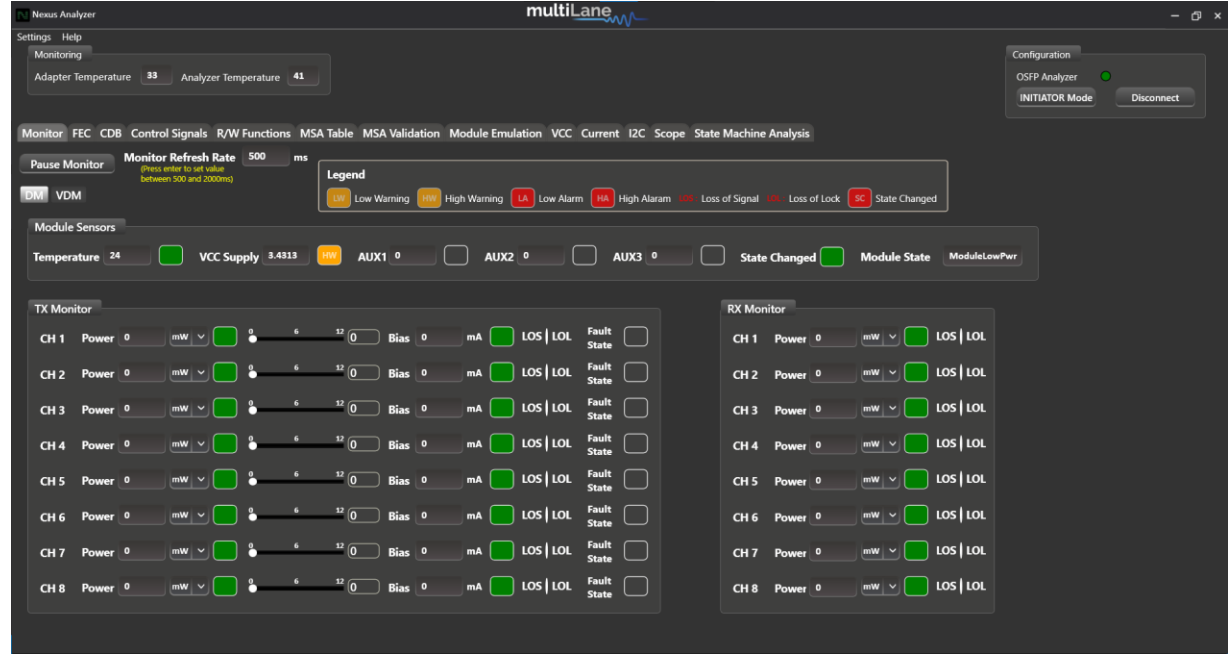
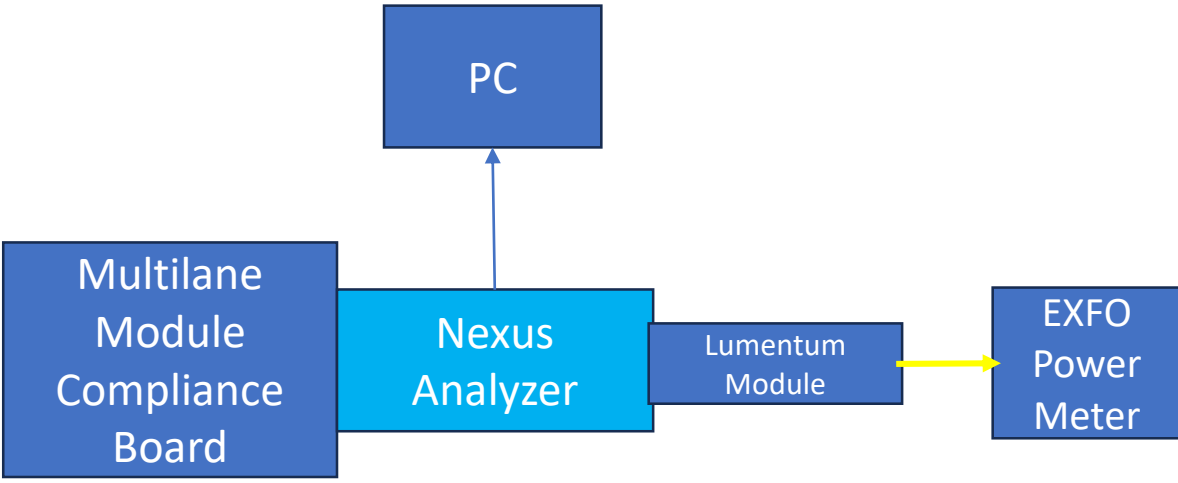
400G modules:

- 400G-XR (Infinera)
- 400ZR+ (Ciena)

VIAVI QSFP-DD Tester

Modern pluggable optical modules can now offer a wide variety of operating modes and capabilities. Appsel allows modules to advertise their operating modes to give seamless host to module management.

Demo C - MSM & Power Control



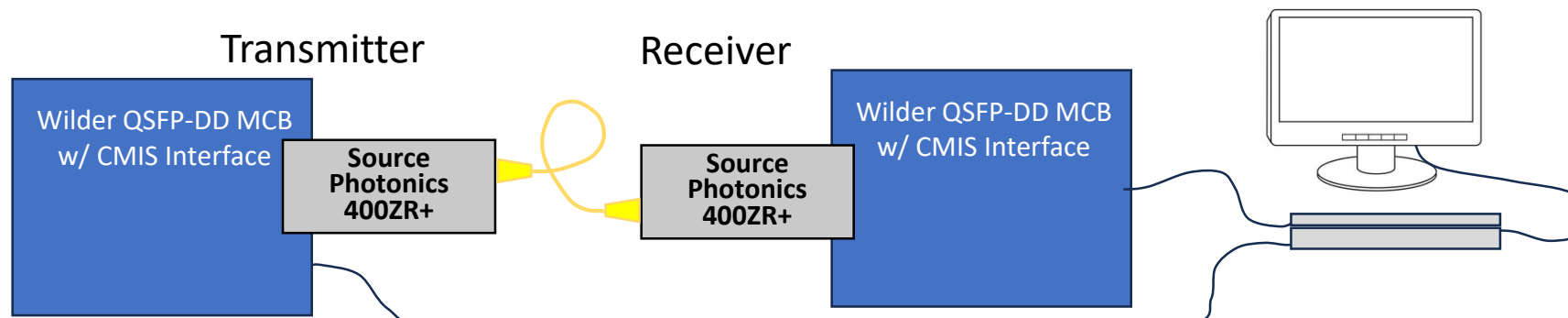
This CMIS demo is showcasing:

- Module state machine transitions triggered by hardware control signals
- Module management by changing the power values
- Digital Monitoring interface showing transceiver power monitoring
- Power meter measures actual optical power output, correlating with values reporting by the monitoring interface

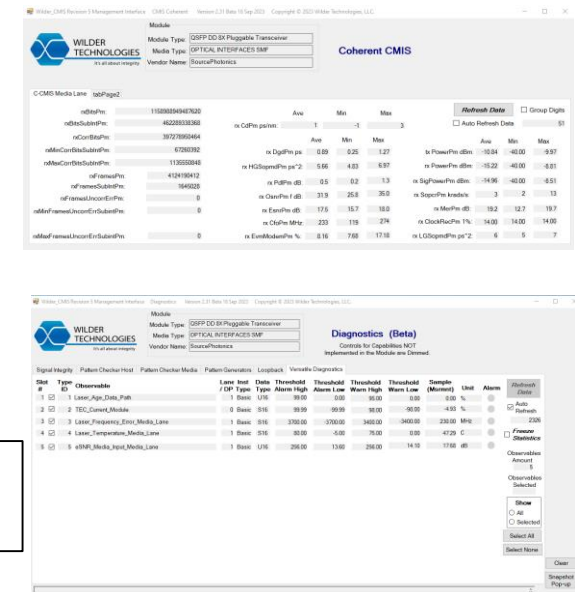
Demo D - Versatile Diagnostics Monitor (VDM)

Versatile Diagnostics Monitor are a set of optional CMIS extensions which provide useful operational information from the module during system integration and ongoing performance monitoring.

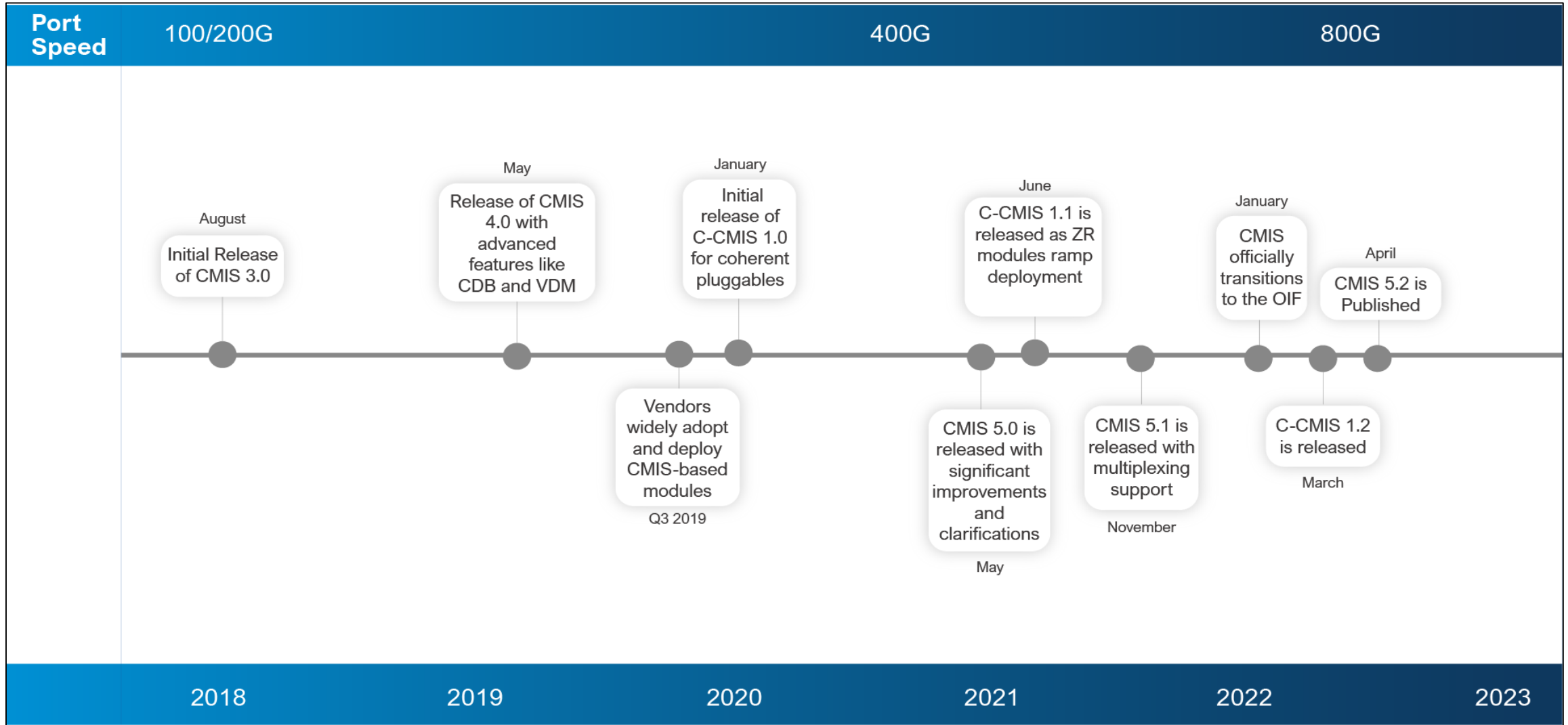
Applied to coherent (400ZR/400ZR+) modules, VDM can monitor important operating parameters, such as I/Q modulator bias', Tx and Rx power, CDR state, etc.



Laptop changes laser output power in transmitter via CMIS. Operation receiver SNR is reported back through CMI. VDM as well as other parameters reported through C-CMIS extensions.



CMIS Evolution Timeline



CMIS Modules – Large range of form factors, applications and capabilities



 LUMENTUM



 Infinera®



JUNIPER
NETWORKS



ciena.



 CISCO



 COHERENT



 SOURCE
PHOTONICS



Amphenol



 PRECISION
OPTICAL TECHNOLOGIES



 O-Net
Technologies

CMIS Host switch/routers

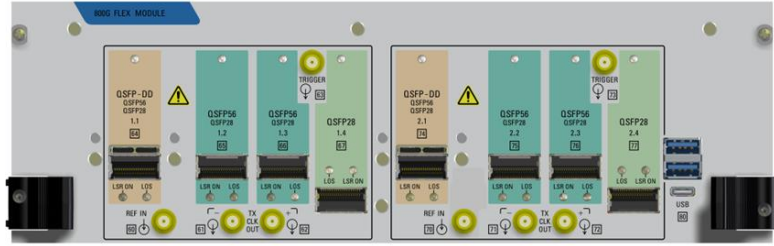


JUNIPER
NETWORKS

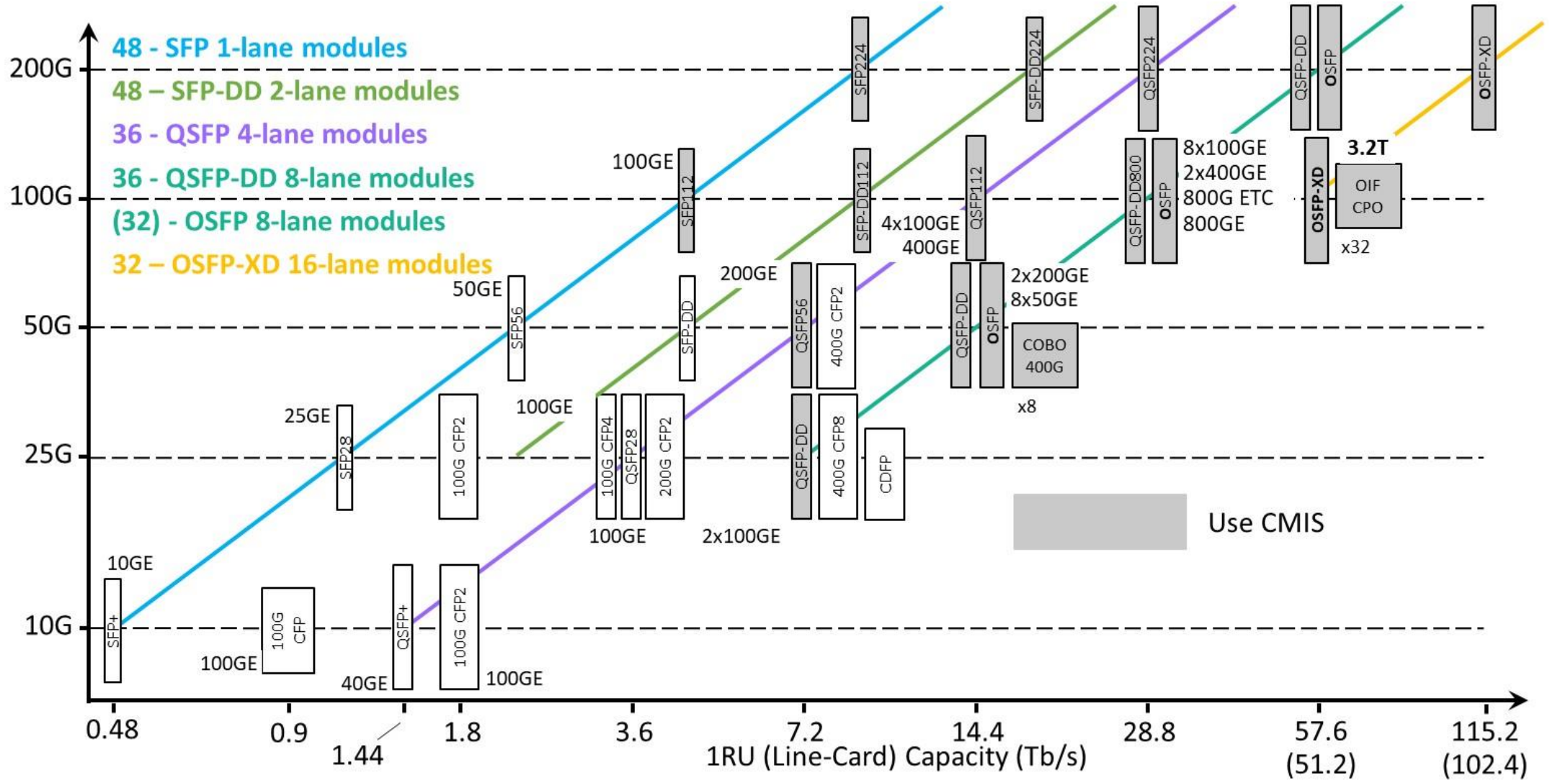


CISCO

CMIS test equipment



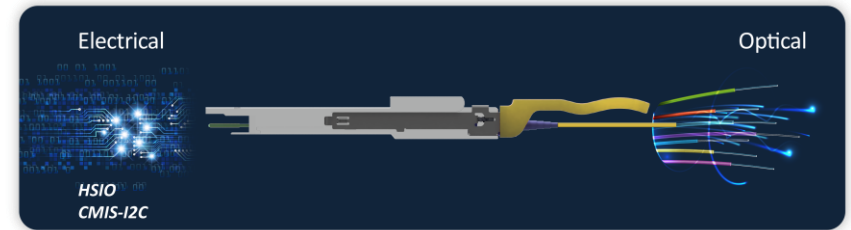
CMIS Adoption



What's next for CMIS?

- The OIF management track team is working on the next release of CMIS which will include:
 - Working with the OIF electrical track to support link training for upcoming higher speed electrical interfaces like CEI-112 and CEI-224.
 - Working with the OIF co-packaging track to define management of CPO and ELSFP modules.
 - Working with other MSA groups to update the definition of Form Factor Specific Hardware Signals.
 - Expanding the number of supported applications by growing the number of Appsels.

CMIS Values



- **Common:** Standardized rule book for all MSA vendors -> all modules seamlessly plug and play into your host
- **Flexible:** CMIS is defined to support variety of modules with different speeds, form factors, link ratings, use cases, etc.
- **Extendable:** CMIS is futureproofed for tomorrow's pluggable innovations.

CMIS Demo – Participating Members

Amphenol

ciena

CISCO

COHERENT

EXFO

Infinera

JUNIPER
NETWORKS

LUMENTUM

multiLane

O-Net
Technologies

PRECISION
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