# OIF CMIS Live Demo

## ECOC 2022

Basel, Switzerland

September 18-21, 2022

# 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
- The industry has embraced CMIS leading to continued efforts to evolve CMIS with the addition of support for:
  - Coherent modules
  - Multiplexing modules
  - Fibre channel

# 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 OSFP, QSFP-DD and QSFP112 modules and more.

- CMIS gives access to the low-speed I2C interface to control and program the module.

## WHAT IS CMIS?

Common Management
Interface Specification

- 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
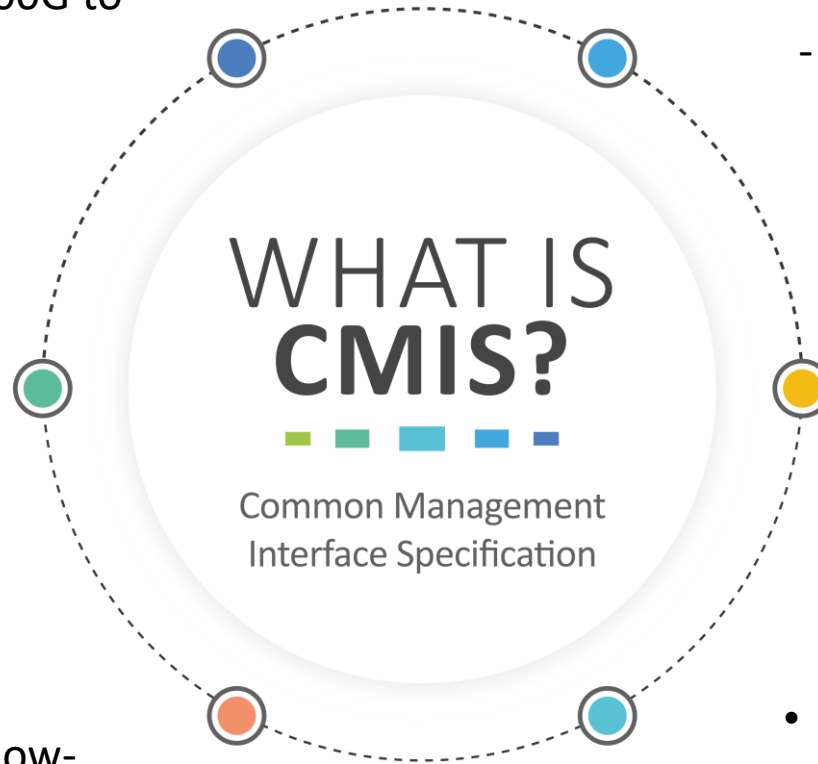
# Demo #1: CMIS Diagnostics and Module State Machine in Action

**EXFO Tester:**

- Built-in display for module identifiers and CMIS compliant support.
- Real time depiction of module diagnostics (TX/RX power, etc.) and link state
- Validation of I2C, electrical and optical module specifications
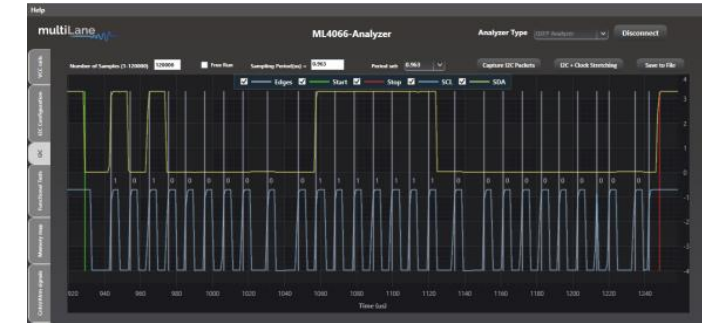
**MultiLane CMIS Analyzer:**

- I2C packet capture between module and host
- Interactive State Machine monitors module power-up

**Juniper 400G Module:**

- Reports ID and Diagnostic Data
- CMIS 4.0 Compliant

# Demo #2: CMIS Service Awareness



Cisco 400GBASE-DR4 QSFP-DD

VIAVI QSFP-DD Tester

| 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 | 001C | 400GBASE-DR4 | 4 |
| 2 | 000D | 100GAUI-2 C2M | 2 | 0055 | 0014 | 100GBASE-DR | 1 |
| 3 | 00FF | End of List | 0 | 0000 | 0000 | Undefined | 0 |
| 4 | 0000 | Undefined | 0 | 0000 | 0000 | Undefined | 0 |

**Advertised Module Capabilities**

Staged Control Set 0   Staged Control Set 1   **Active Control Set**

| Lane # | App. Code | D.-Path Code | Explc. Cntrl | Tx Adapt. Eq. Ena. | Tx Adapt. Eq. Recall. | Tx Fixed Eq. Control | Tx CDR | Rx CDR | Rx Eq. Pre-Tap | Rx Eq. Post-Tap |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 2 | 0 | OFF | ON | 00b (Do not recall) | 0011b (3 dB) | ON | ON | 0010b (1.0 dB) | 0000b (N |
| 1 | 2 | 0 | OFF | ON | 00b (Do not recall) | 0011b (3 dB) | ON | ON | 0010b (1.0 dB) | 0000b (N |
| 2 | 2 | 2 | OFF | ON | 00b (Do not recall) | 0011b (3 dB) | ON | ON | 0010b (1.0 dB) | 0000b (N |
| 3 | 2 | 2 | OFF | ON | 00b (Do not recall) | 0011b (3 dB) | ON | ON | 0010b (1.0 dB) | 0000b (N |
| 4 | 2 | 4 | OFF | ON | 00b (Do not recall) | 0011b (3 dB) | ON | ON | 0010b (1.0 dB) | 0000b (N |
| 5 | 2 | 4 | OFF | ON | 00b (Do not recall) | 0011b (3 dB) | ON | ON | 0010b (1.0 dB) | 0000b (N |
| 6 | 2 | 6 | OFF | ON | 00b (Do not recall) | 0011b (3 dB) | ON | ON | 0010b (1.0 dB) | 0000b (N |
| 7 | 2 | 6 | OFF | ON | 00b (Do not recall) | 0011b (3 dB) | ON | ON | 0010b (1.0 dB) | 0000b (N |

**Currently Active Settings (Active Control Set)**

**Data Path Enable:**

| Lane 0 | Auto |
| Lane 1 | Auto |
| Lane 2 | Auto |
| Lane 3 | Auto |
| Lane 4 | Auto |
| Lane 5 | Auto |
| Lane 6 | Disabled |
| Lane 7 | Disabled |

Apply

| Lane | Data Path State | Data Path Conf. Validity |
|---|---|---|
| 0 | 4 'Data Path Activated' | 1 'Config accepted' |
| 1 | 4 'Data Path Activated' | 1 'Config accepted' |
| 2 | 4 'Data Path Activated' | 1 'Config accepted' |
| 3 | 4 'Data Path Activated' | 1 'Config accepted' |
| 4 | 4 'Data Path Activated' | 1 'Config accepted' |
| 5 | 4 'Data Path Activated' | 1 'Config accepted' |
| 6 | 1 'Data Path Deact.' | 1 'Config accepted' |
| 7 | 1 'Data Path Deact.' | 1 'Config accepted' |

**Active Data Path Management**

# Demo #3: Extending CMIS Features with FW Upgrade via Common Data Block



**Lumentum 400ZR Module:**
- Reports ID, State Status, and Link/DDM/VDM Diagnostic Data
- CMIS 4.0/5.0 Compliant
- CDB Firmware Upgrades supported
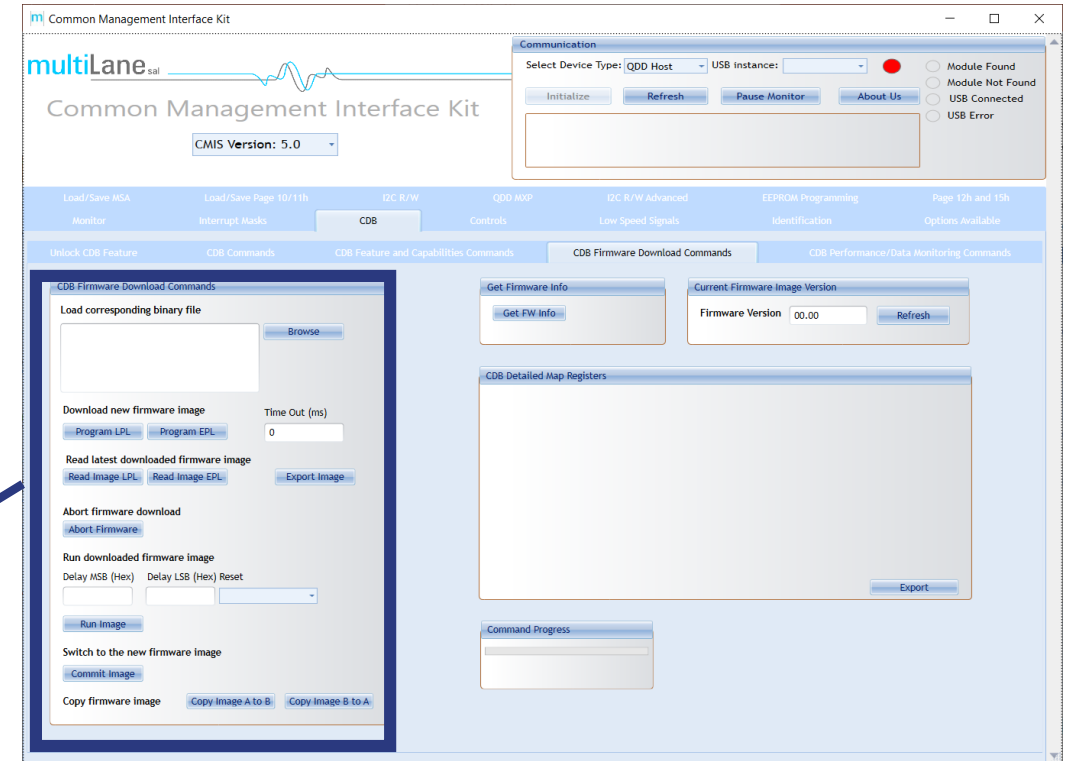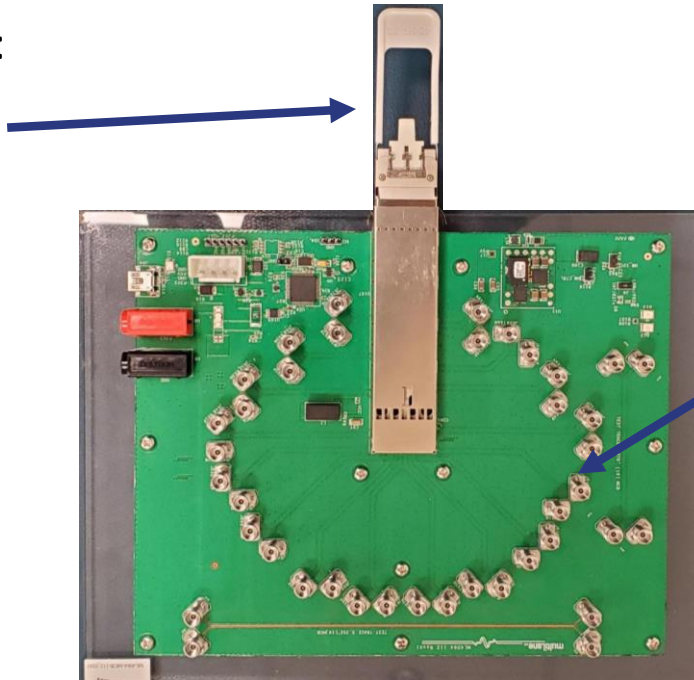
**MultiLane MCB CMIS GUI:**
- CDB command advertisement -> Full CMIS commands supported
- Live EPL/LPL FW download/update via CDB dashboard

# Demo #4: Versatile Diagnostic Monitoring

Lumentum 400ZR QSFP-DD

Ciena Evaluation Board

- **Real time monitoring of VDM observables**

- **Hosts can write one VDM manager for all vendors and module types.**

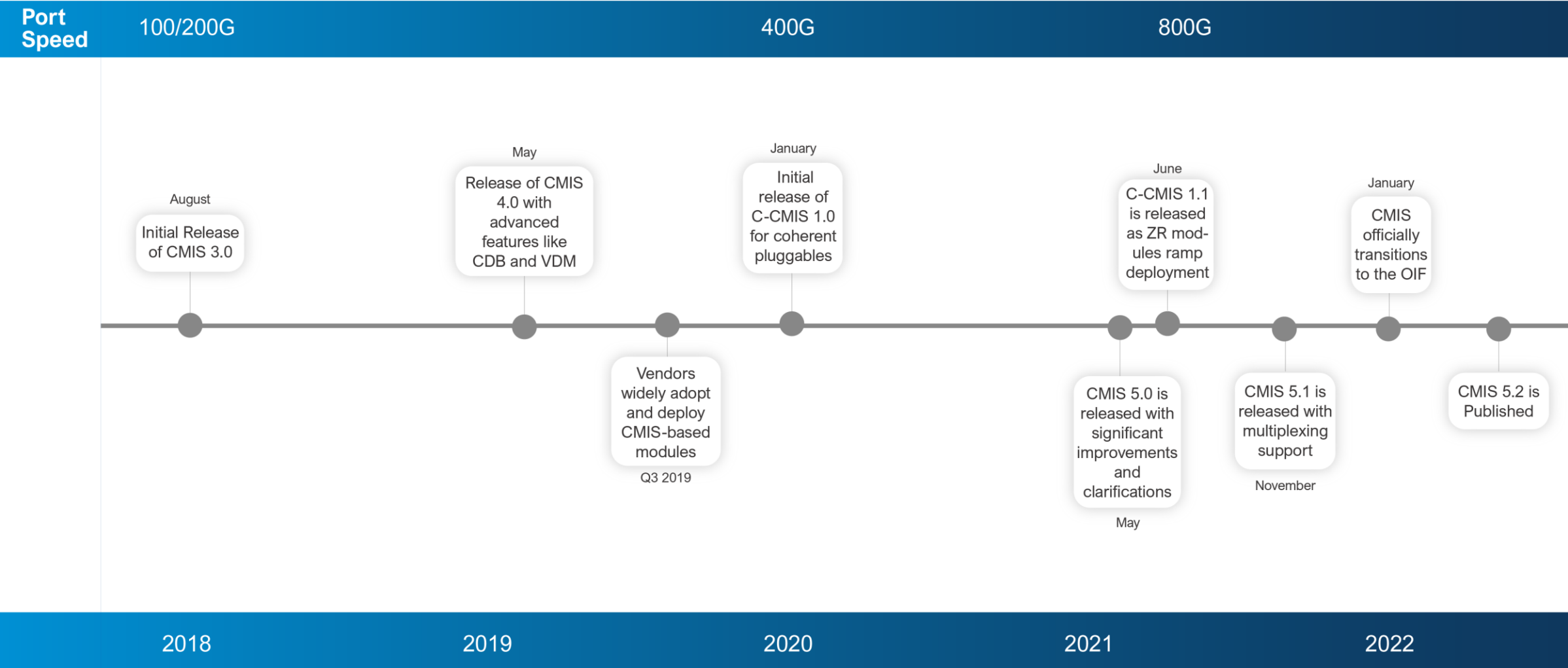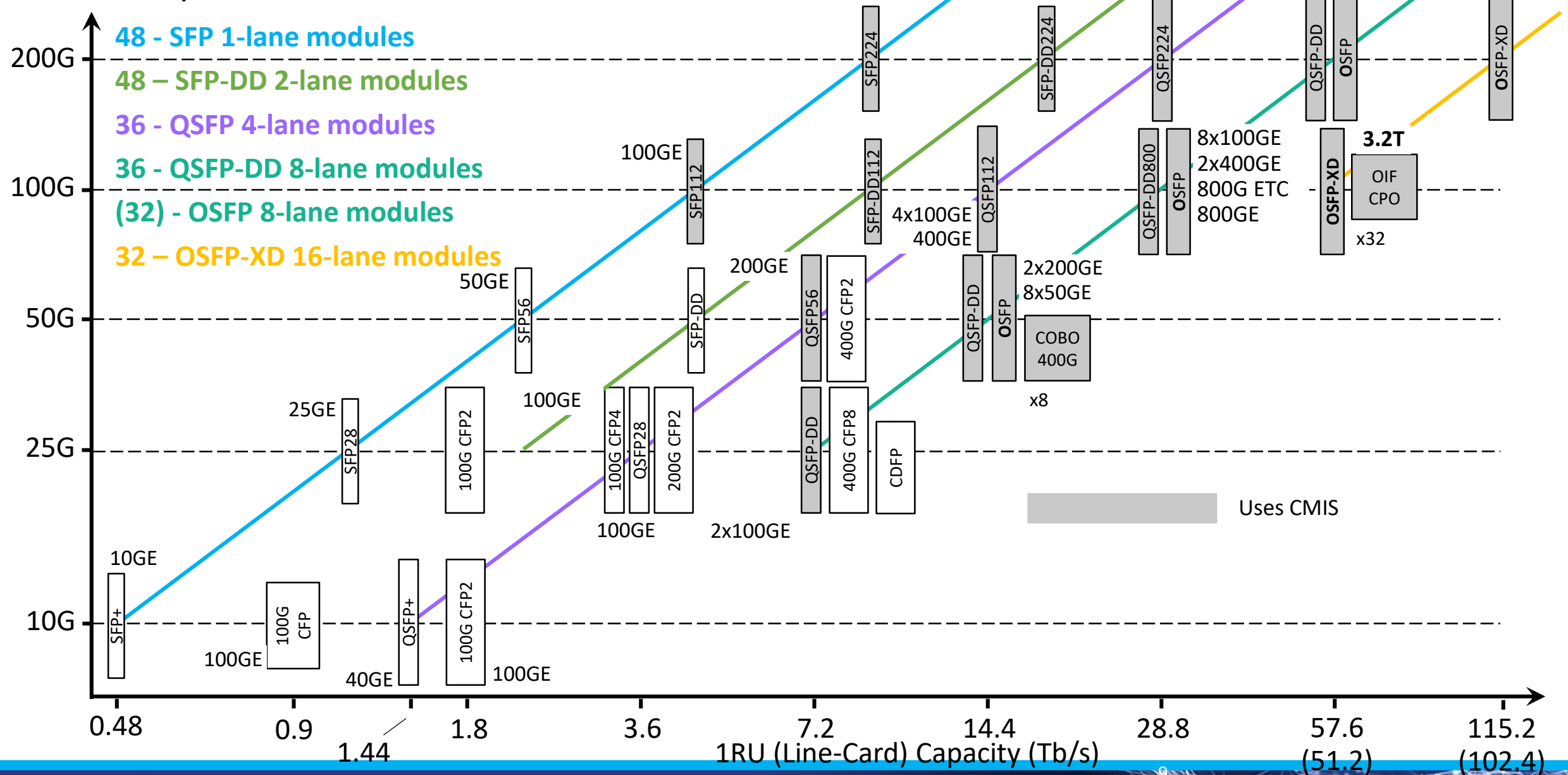- **Modules can organize the specific VDMs for their module.**
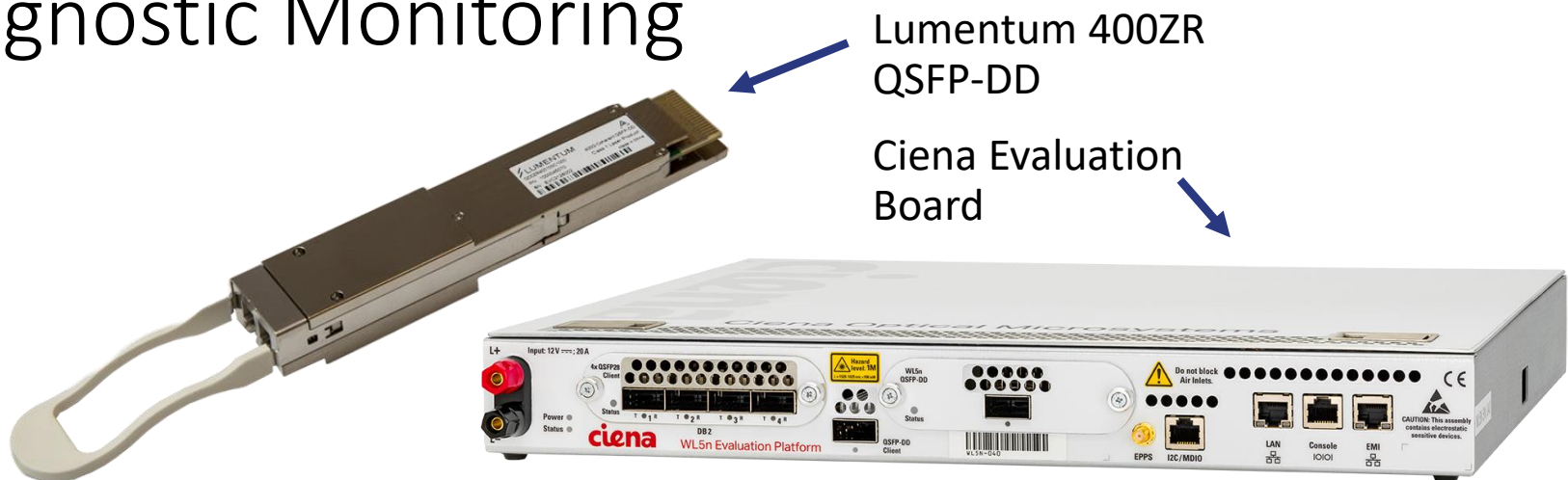
## Page 2Xh (VDM)

### VDM Summary

| | Value | High Alarm Threshold | High Warn Threshold | Low Warn Threshold | Low Alarm Threshold |
|---|---|---|---|---|---|
| Laser Age (0% at BOL, 100% EOL) | 0 % | 99 | 95 | 0 | 0 |
| Laser Frequency Error (Media Lane) | 0 MHz | 3700 | 3400 | -3400 | -3700 |
| Laser Temperature (Media Lane) | 52.76 C | 80.00 | 75.00 | 0.00 | -5.00 |
| eSNR (Media Lane) | 16.74 dB | 256.00 | 256.00 | 14.05 | 13.55 |
| Pre-FEC BER Current Value Media | 7.930e-04 | 1.250e-02 | 9.070e-03 | 0.000e+00 | 0.000e+00 |
| Pre-FEC BER Current Value Host Lane 1 | 0.000e+00 | 2.390e-04 | 4.380e-05 | 0.000e+00 | 0.000e+00 |
| FERC Current Value Media | 0.000e+00 | 5.000e-01 | 5.000e-01 | 0.000e+00 | 0.000e+00 |
| FERC Current Value Host Lane 1 | 0.000e+00 | 5.000e-01 | 5.000e-01 | 0.000e+00 | 0.000e+00 |
| Modulator Bias X/I | 4.98 % | 100.00 | 98.00 | 0.00 | 0.00 |
| Modulator Bias X/Q | 4.26 % | 100.00 | 98.00 | 0.00 | 0.00 |
| Modulator Bias Y/I | 29.58 % | 100.00 | 98.00 | 0.00 | 0.00 |
| Modulator Bias Y/Q | 24.36 % | 100.00 | 98.00 | 0.00 | 0.00 |
| Modulator Bias X_Phase | 2.58 % | 100.00 | 98.00 | 0.00 | 0.00 |
| Modulator Bias Y_Phase | 1.98 % | 100.00 | 98.00 | 0.00 | 0.00 |
| CD (High Granularity, Short Link) | 1 ps/nm | 2800 | 2500 | -2500 | -2800 |
| CD (Low Granularity, Long Link) | 0 ps/nm | 2800 | 2500 | -2500 | -2800 |

# CMIS Evolution Timeline

| Port Speed | 100/200G | | 400G | | 800G | |
|---|---|---|---|---|---|---|

**August**
Initial Release of CMIS 3.0

**May**
Release of CMIS 4.0 with advanced features like CDB and VDM

Vendors widely adopt and deploy CMIS-based modules
Q3 2019

**January**
Initial release of C-CMIS 1.0 for coherent pluggables

**June**
C-CMIS 1.1 is released as ZR modules ramp deployment

CMIS 5.0 is released with significant improvements and clarifications
May

CMIS 5.1 is released with multiplexing support
November

**January**
CMIS officially transitions to the OIF

CMIS 5.2 is Published

| 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|

# CMIS Adoption



- **48 - SFP 1-lane modules**
- **48 – SFP-DD 2-lane modules**
- **36 - QSFP 4-lane modules**
- **36 - QSFP-DD 8-lane modules**
- **(32) - OSFP 8-lane modules**
- **32 – OSFP-XD 16-lane modules**

Uses CMIS

1RU (Line-Card) Capacity (Tb/s)

# CMIS Modules – Large range of form factors, applications and capabilities
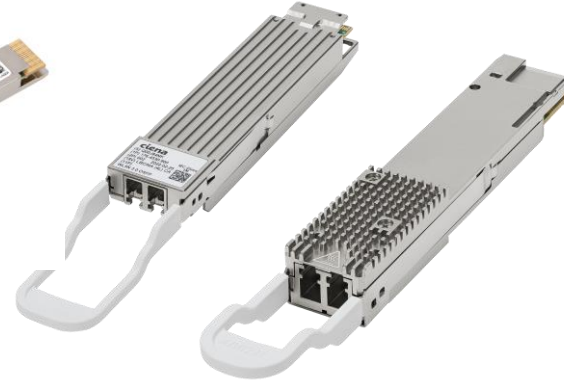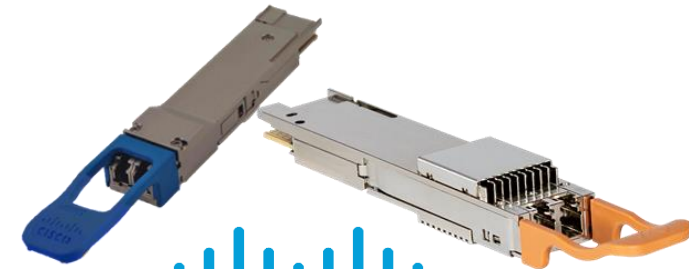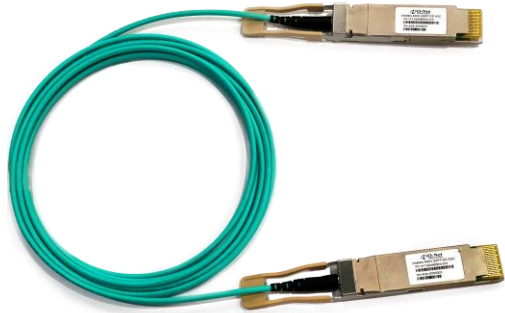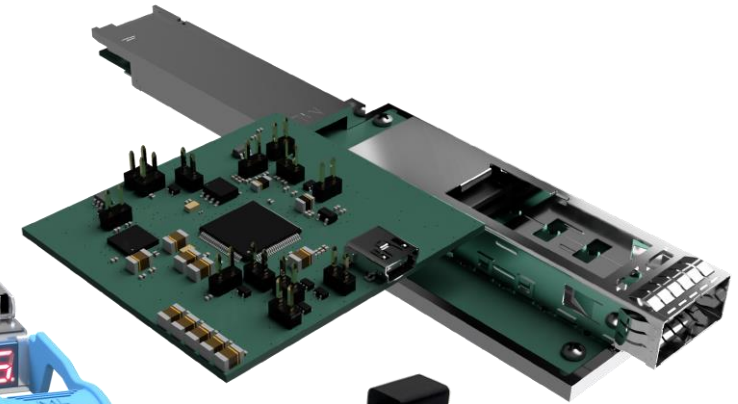
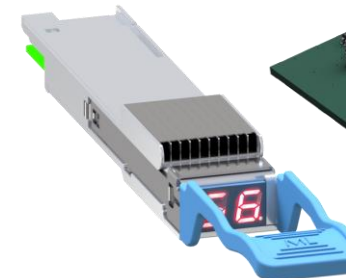# CMIS Hosts – Large range of applications including routers and test equipment

# 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 define link training for upcoming higher speed 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.
    - Resolution of comments received from a wide range of interested parties.

# CMIS Values
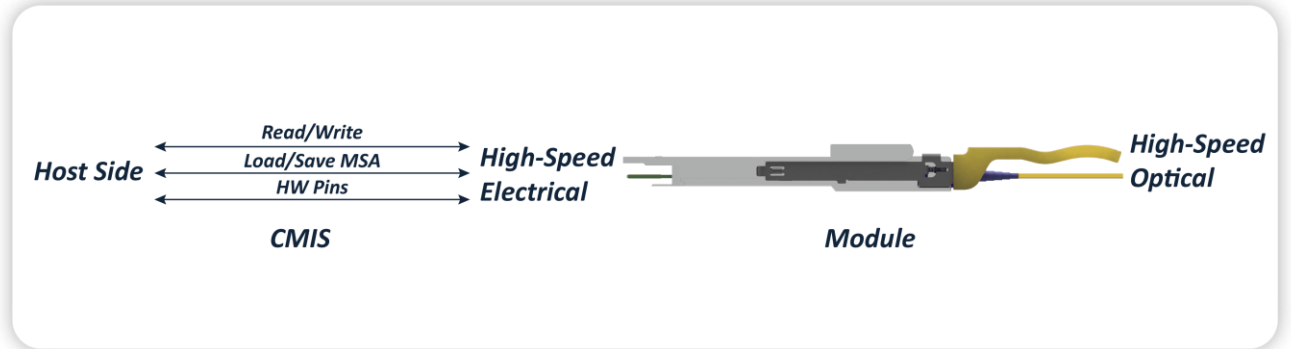


- **Common:** Standardized rule book for all MSA vendors -> all modules seamlessly plug and play into your host

- **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.

# OIF Workshop - "CMIS - Demystified"

hosted by *Lightwave*
Tuesday, October 4, 2022 - 8am-9:30am PT

- Free webinar, open to the public
- To register, visit https://www.lightwaveonline.com/webcasts

With widespread deployments and continuous feature additions, the Common Management Interface Specification (CMIS) is the leading management interface for modules ranging from copper cables to coherent pluggables.

CMIS is a powerful, far-reaching tool set you will need to be aware of for its impact on current and future generation designs. Join this OIF-sponsored workshop to hear from industry experts on what CMIS is and why it is important to the entire industry.

Speakers from: Ciena, Cisco, Google, Marvell, TE Connectivity

**LIGHTWAVE**

# CMIS Demo – Participating Members

www.oiforum.com