OIF
PLL INTEROP DEMO
OFC 2024

OFC - CMIS Live Demo

OFC 2024

Why was CMIS started?

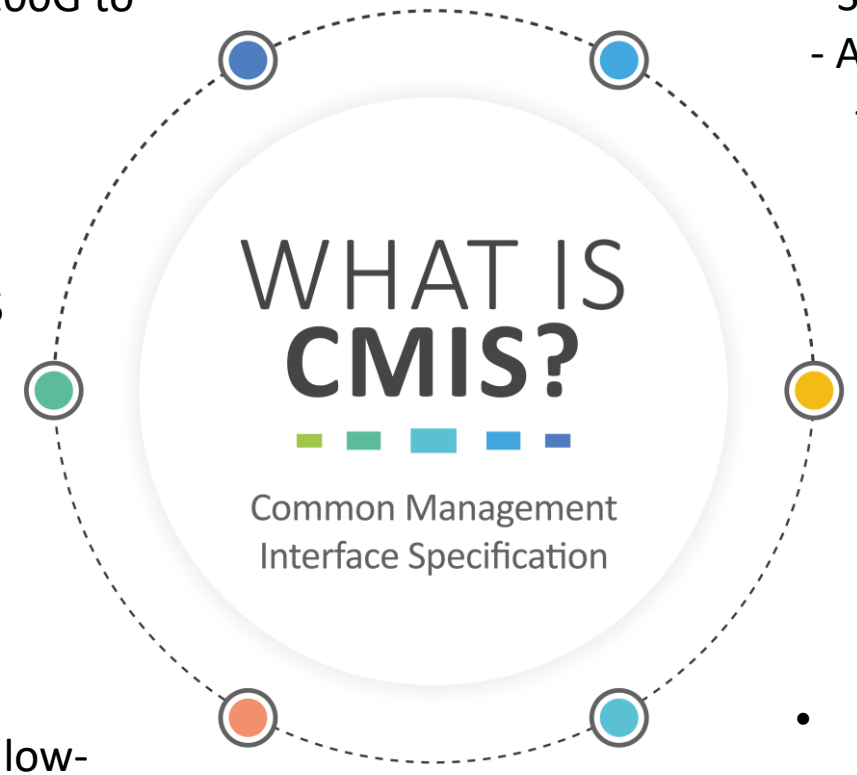
- CMIS was originally conceived to address industry pain points in module management :
  - Management of multiple form factors
  - Module initialization variability
  - Breakout – managing multiple different services (ie SFF-8024 codes)
- The industry has embraced CMIS leading to continued efforts to 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 1.6T. 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 – Path to Plug and Play

- CMIS based modules are becoming more complex each year.
- Integration of modules into hosts is taking longer and often requires host software development to manage a new module.
- CMIS is looking to provide ways to reduce/eliminate the integration time.
- Long term goal is to be able insert a new module into a host and manage the module (bring up module, initialize the datapath, standard CMIS defined monitoring) without any new host software development required.

Path to 3rd party plug and play

CMIS – Path to Plug and Play

- Provisioning
  - Common module state machine
  - Common data path state machine
  - Appsel based provisioning

- Monitoring
  - Versatile Diagnostic Monitoring (VDM)
  - Fixed Registers for common monitoring (Rx optical power, temperature, etc)

- Advertising
  - Module describes itself to host
  - Applicable to all parts of module management (provisioning, monitoring, upgrades, etc)

- Upgrades
  - Common upgrade infra-structure

Path to 3rd party plug and play

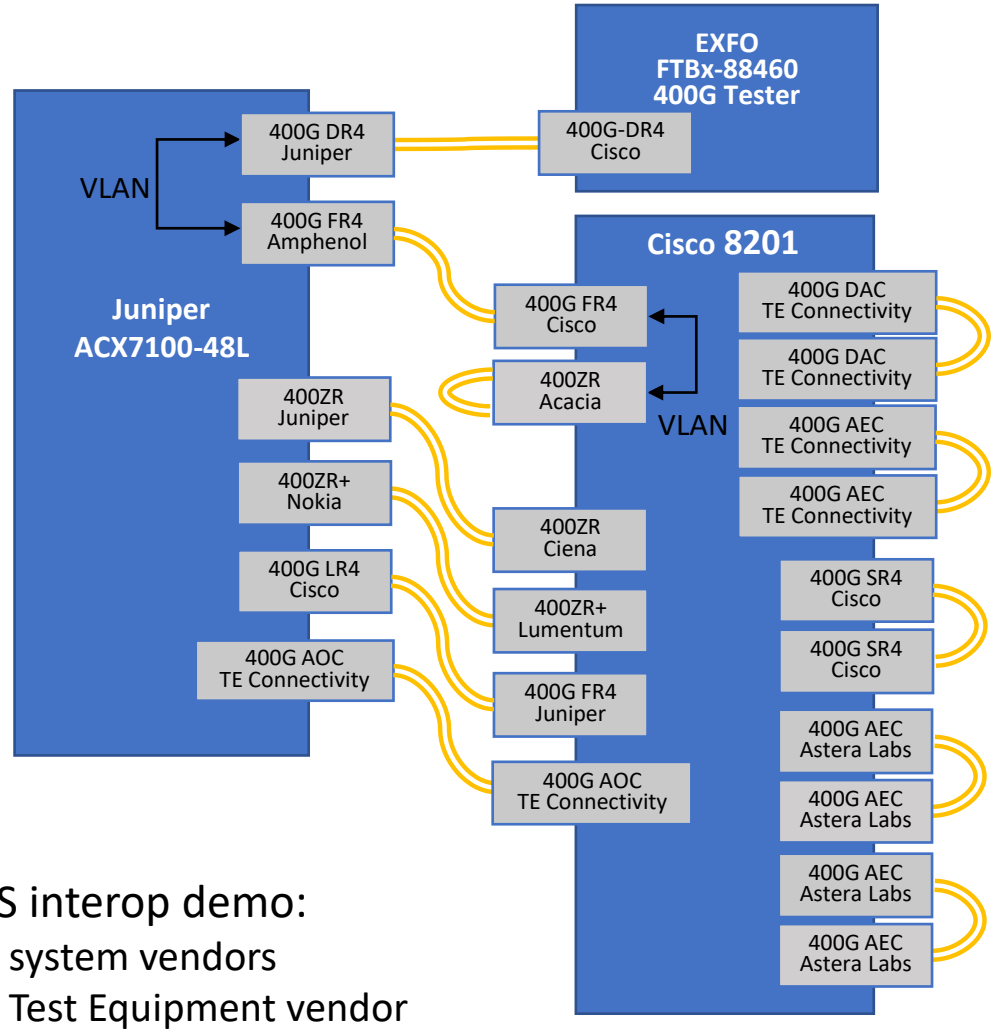
CMIS Demo Overview

- 3 switch/router vendors (Ciena, Cisco, Juniper Networks)
- 3 test equipment vendors (EXFO, MultiLane, Wilder Technologies)
- 9 module suppliers (Amphenol, Astera Labs, Ciena, Cisco, Infinera, Juniper Networks, Lumentum, Nokia, TE Connectivity)
- 9 interface reaches ranging from passive copper to 400G coherent (DAC, AEC, AOC, SR4, DR4, FR4, LR4, 400ZR, 400ZR+)
- CMIS versions – CMIS 3.0, 4.0, 5.0, 5.1

One common management platform - CMIS

Demo A - Multi-vendor interop through (CMIS)

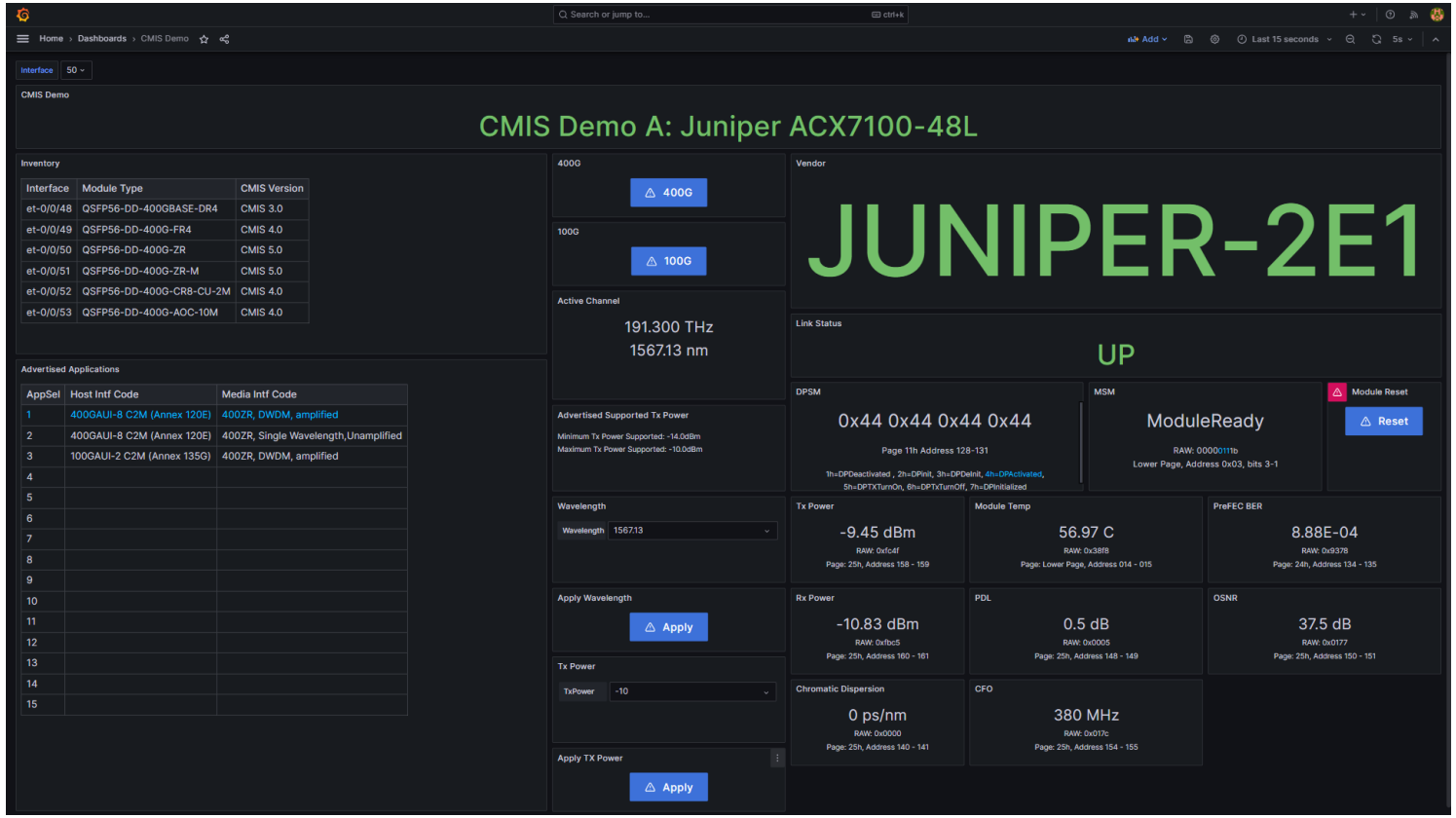
- Routers/pluggables/TMEs under common management
- Demo content:
  - CMIS module inventory – CMIS revision, Module type adv.
  - Application Advertisement & Selection
    - CMIS standard application advertisement & selection
    - *Active operating mode switching through CMIS (**AppSel**)*
      - *MSM/DPSM transition (Grafana)*
  - CMIS standard DWDM optics control features:
    - *CMIS **AppSel** (operating mode selection)*
    - *CMIS **Channel selection***
    - *CMIS **Tx output power adjustment***
  - MSM/DPSM
    - CMIS standard module bring-up with MSM/DPSM
  - *VDMs*
    - *CMIS **VDMs** for performance monitoring*

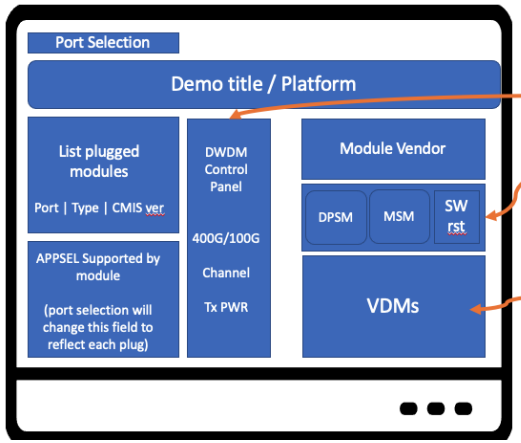


CMIS interop demo:

- ✓ 2 system vendors
- ✓ 1 Test Equipment vendor
- ✓ 9 module vendors with 8 different plug types

Demo A: Juniper Grafana Dashboard



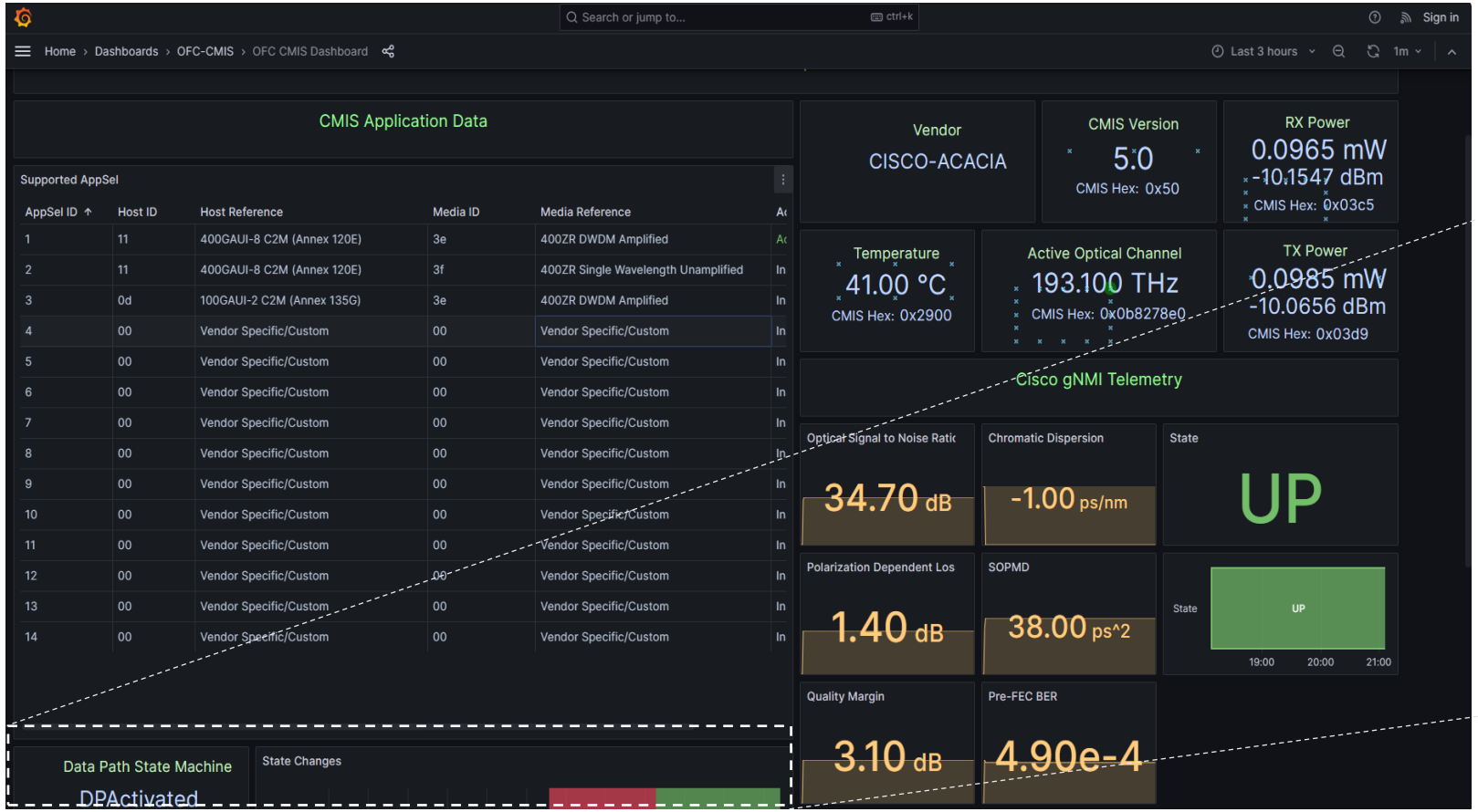


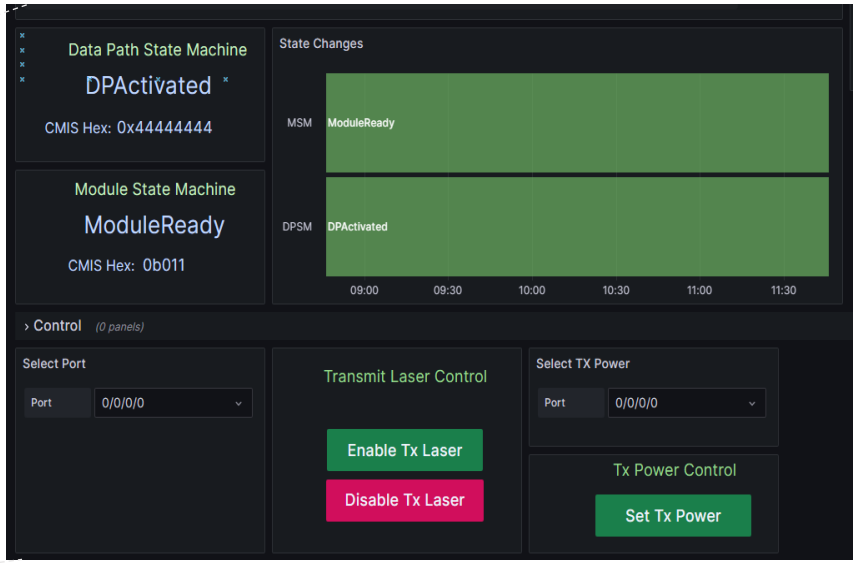
Functional control for complex module (DWDM)

MSM/DPSM responding to any changes in control, which includes the SW reset button. (need to check DAC/AEC)

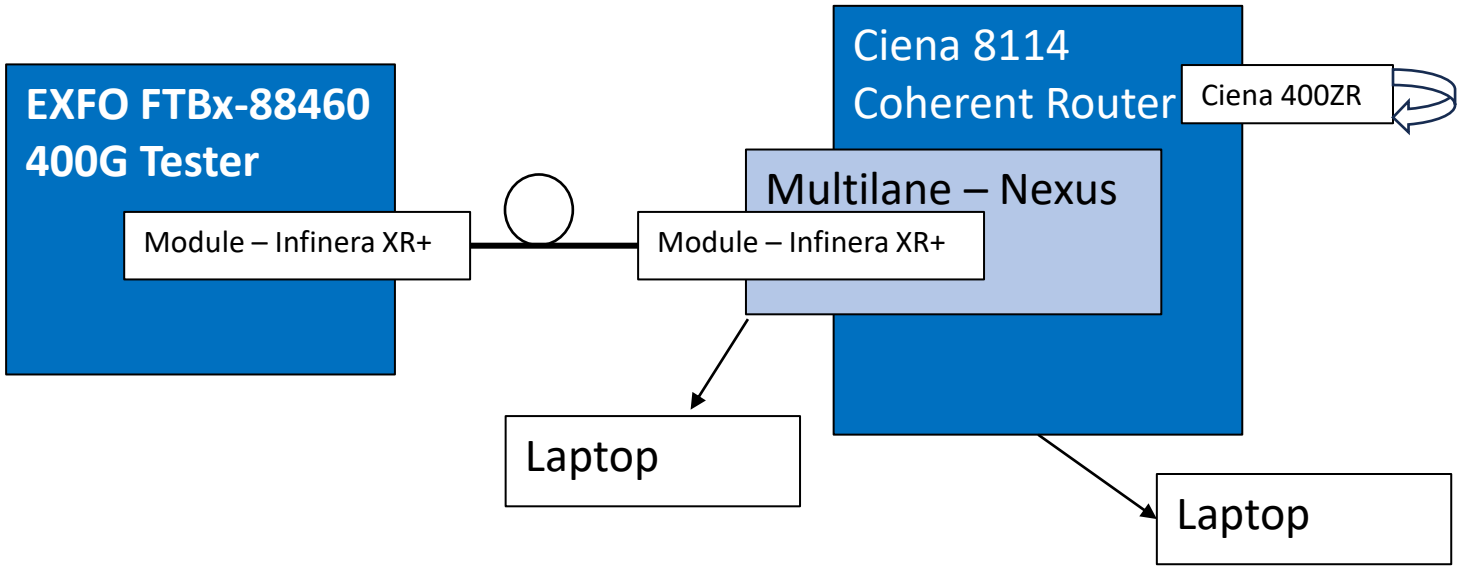
Clear target for optical pluggables. For other ports (passive) → display NA

Demo A: Cisco Grafana Dashboard





Demo B - APPSEL Based Provisioning




```
+-------------------- XCVRS VENDOR-DATA ----------------------+
| Xcvr Id | Vendor Details                  | Module HW version |
+---------+---------------------------------+-------------------+
| 2/1     | Infinera_Inc. XRQDCD400MAE2ZZZ  | 05                |
| 2/2     | CIENA 176-3530-900              | 05                |
+---------+---------------------------------+-------------------+
8114> show xcvrs apsel xcvr  2/1
                                  XCVR APSEL SPACE FOR 2/1 ----------------------------------+
| App No. | App Name                | MediaName(Code) | HostName(Code)      | HostCode Supported |
+---------+-------------------------+-----------------+---------------------+--------------------+
| 1       | 400GZR+:400GAUI8        | 400GZR+(0x46)   | 400GAUI8(0x11)      | Yes                |
| 2       | 400GZR+:100GAUI2        | 400GZR+(0x46)   | 100GAUI2(0xd)       | Yes                |
| 3       | UNKNOWN:100GAUI2        | UNKNOWN(0x47)   | 100GAUI2(0xd)       | Yes                |
| 4       | UNKNOWN:100GAUI2        | UNKNOWN(0x48)   | 100GAUI2(0xd)       | Yes                |
| 5       | UNKNOWN:CAUI4-NO-FEC    | UNKNOWN(0x48)   | CAUI4-NO-FEC(0x41)  | No                 |
| 6       | UNKNOWN:CAUI4-NO-FEC    | UNKNOWN(0x49)   | CAUI4-NO-FEC(0x41)  | No                 |
| 7       | CUSTOM:400GAUI8         | CUSTOM(0xc4)    | 400GAUI8(0x11)      | Yes                |
| 8       | CUSTOM:100GAUI2         | CUSTOM(0xc4)    | 100GAUI2(0xd)       | Yes                |
| 9       | CUSTOM:CAUI4-NO-FEC     | CUSTOM(0xc4)    | CAUI4-NO-FEC(0x41)  | No                 |
| 10      | CUSTOM:CUSTOM           | CUSTOM(0xc4)    | CUSTOM(0x5)         | No                 |
| 11      | CUSTOM:200GAUI4         | CUSTOM(0xc4)    | 200GAUI4(0xf)       | Yes                |
| 12      | CUSTOM:CUSTOM           | CUSTOM(0xc4)    | CUSTOM(0xa)         | No                 |
| 13      | CUSTOM:CUSTOM           | CUSTOM(0xc4)    | CUSTOM(0x39)        | No                 |
| 14      | CUSTOM:CUSTOM           | CUSTOM(0xc4)    | CUSTOM(0x53)        | No                 |
| 15      | CUSTOM:CUSTOM           | CUSTOM(0xc3)    | CUSTOM(0xc0)        | No                 |
+---------+-------------------------+-----------------+---------------------+--------------------+
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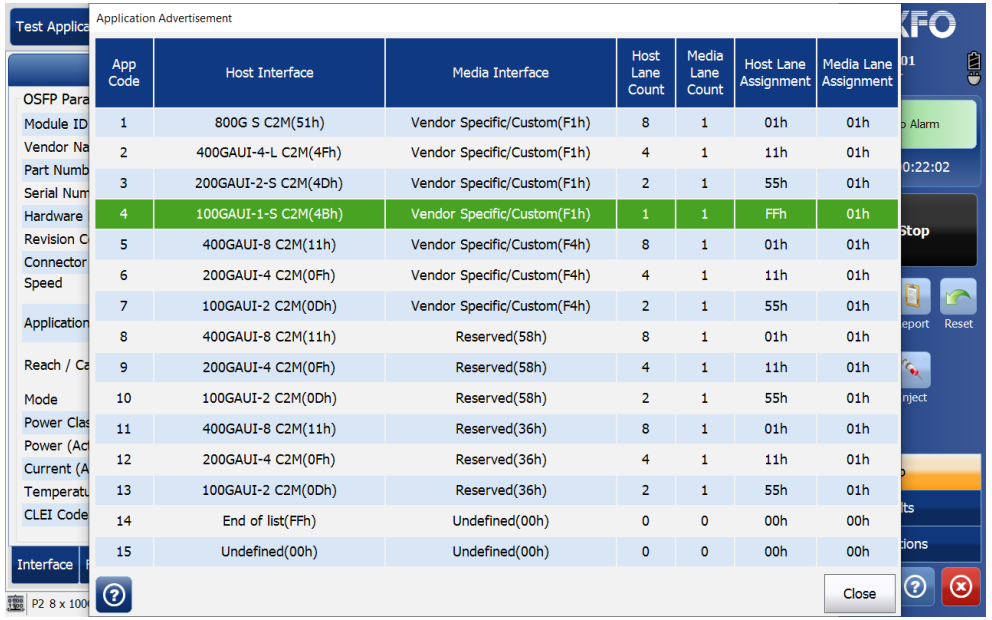


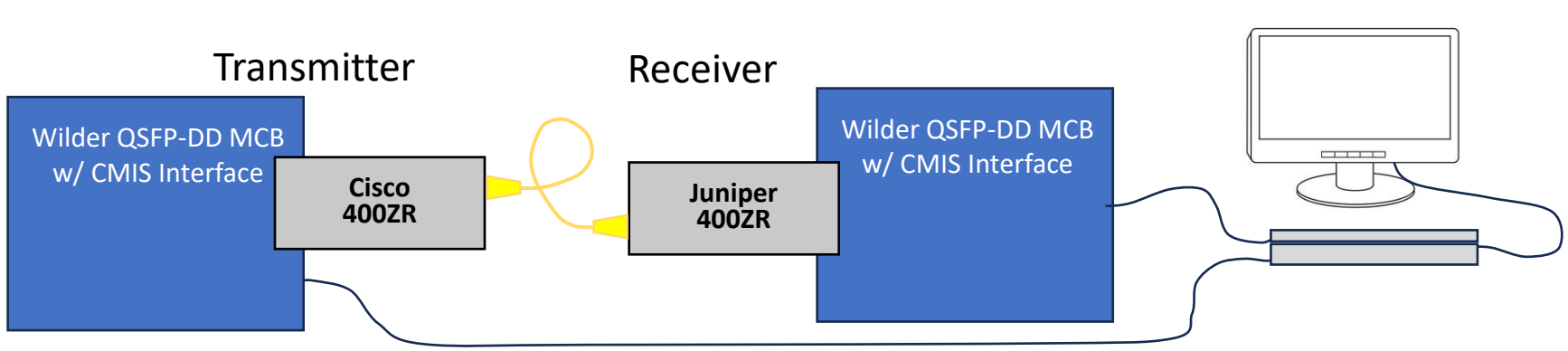
This CMIS demo is showcasing:

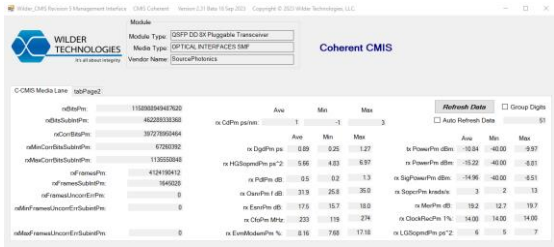
- That hosts can read and display module appsel advertising
- Hosts can provision the module using appsels
- The host can provision non-standard media codes

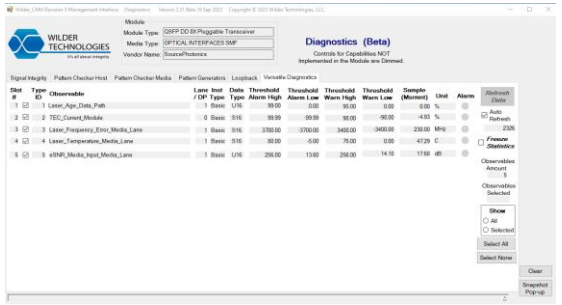
Demo C - Versatile Diagnostics Monitor (VDM)

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 in this demo to coherent (400ZR) modules, VDM is monitoring important operating parameters, such as EVM, Tx and Rx power, CDR state, etc.



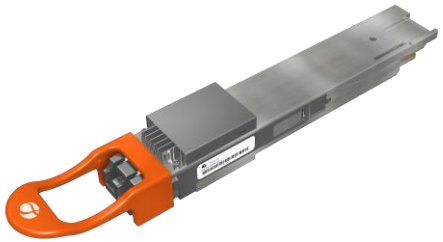




Laptop changes laser output power in transmitter via CMIS. Operation receiver EVM is reported back through CMIS VDM as well as other parameters reported through C-CMIS extensions.

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

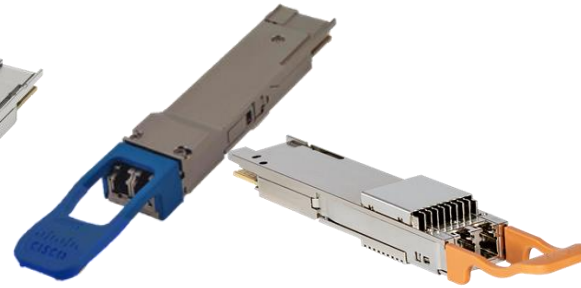
LUMENTUM



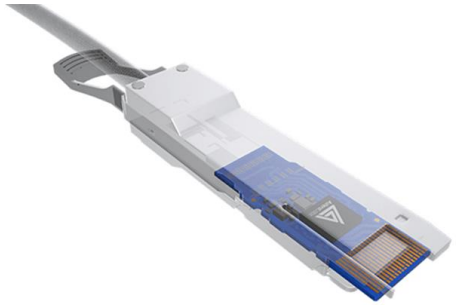
Infinera

JUNIPER NETWORKS

ciena



CISCO



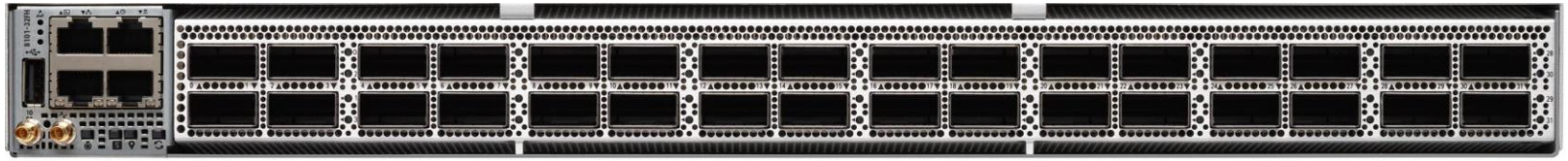
AsteraLabs

Amphenol

TE connectivity

NOKIA

CMIS Host switch/routers



CMIS test equipment

WILDER TECHNOLOGIES
It's all about integrity

EXFO

multiLane

CMIS – A Family of Documents

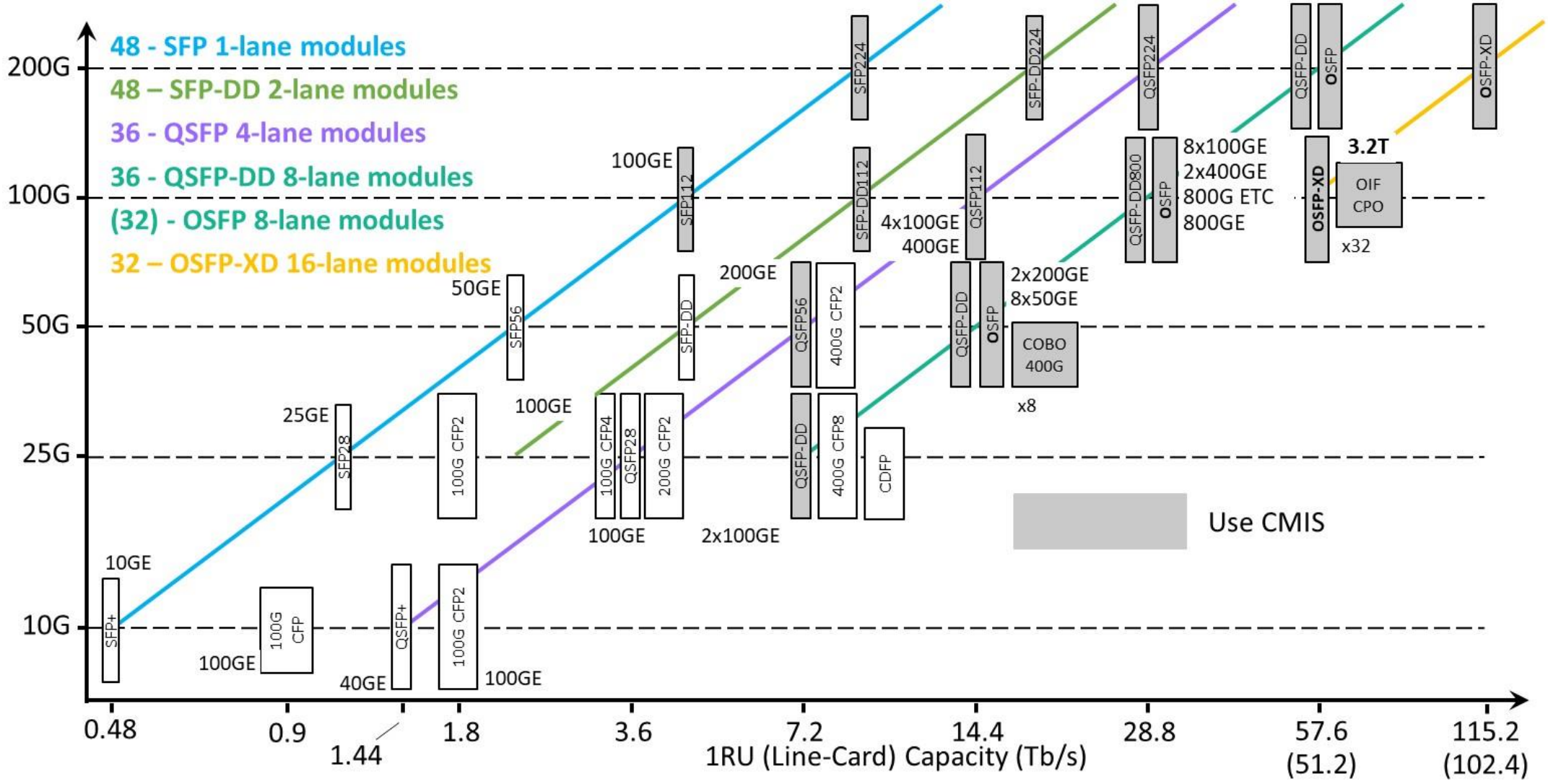
CMIS has grown from a single document to a collection of documents. CMIS is the core and is supported by a set of supplements for specific applications.

- C-CMIS – Coherent CMIS – Provides extensions to CMIS to manage modules with coherent interfaces
- CMIS-FF* – CMIS Form Factor – Provides details of HW pins and related registers for different module form factors.
- CMIS- ELSFP* – CMIS External Laser Small Form Factor Pluggable – Provides details for managing Co-Packaging and ELSFP modules.
- CMIS-LT* – CMIS Link Training – Provides details for managing host side link training on CMIS modules.
- CMIS-VCS* – CMIS Versatile Control Set – Provides details for managing electrical characteristics of host interfaces.

CMIS works in conjunction with other industry standards like SFF-8024 and hardware MSAs.

*Some CMIS extensions are under development and have not been published yet.

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 approaches for upcoming higher speed electrical interfaces like CEI-112 and CEI-224.
  - Working with the OIF Energy Efficient Interfaces (EEI) 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 Demo – Participating Members

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SCAN ME

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