OIF
PLL INTEROP DEMO
OFC 2025

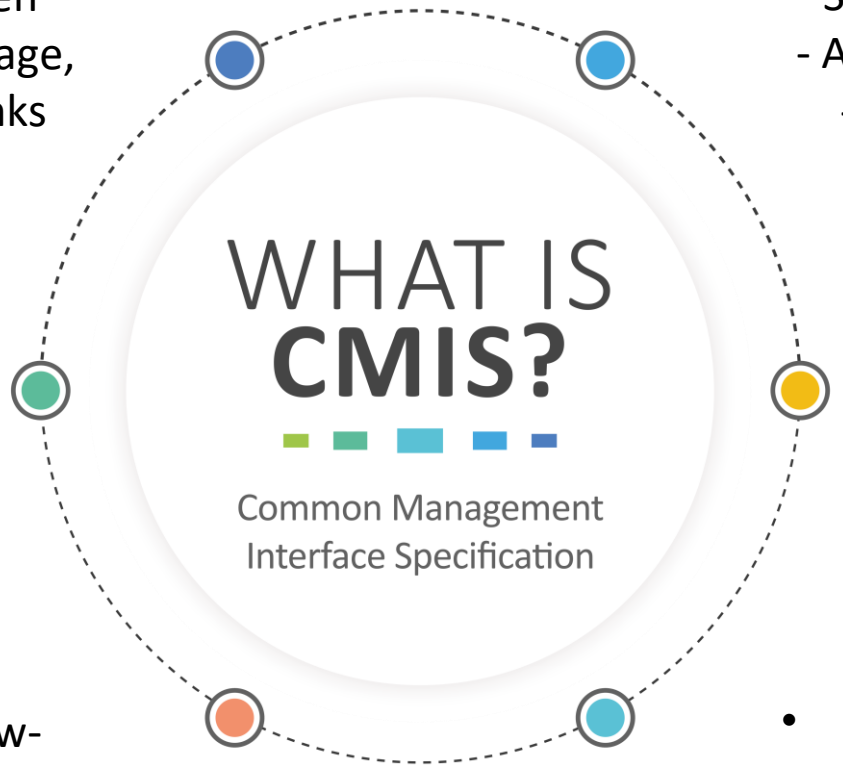
CMIS Interoperability Demo
OFC 2025

Managing Complexity for Pluggable Modules

- Enables interoperability between module and host. Used to manage, test and debug modules and links

- 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/Passive Cable Assemblies
    - Optical Transceivers
      - Coherent DWDM modules
        - ELSFP modules

- Provides communication between all compliant optical modules, switches, and server Network Interface Cards

- Module speeds ranging from 100G to 1.6T. Unites a wide range of transceiver classes under one management protocol

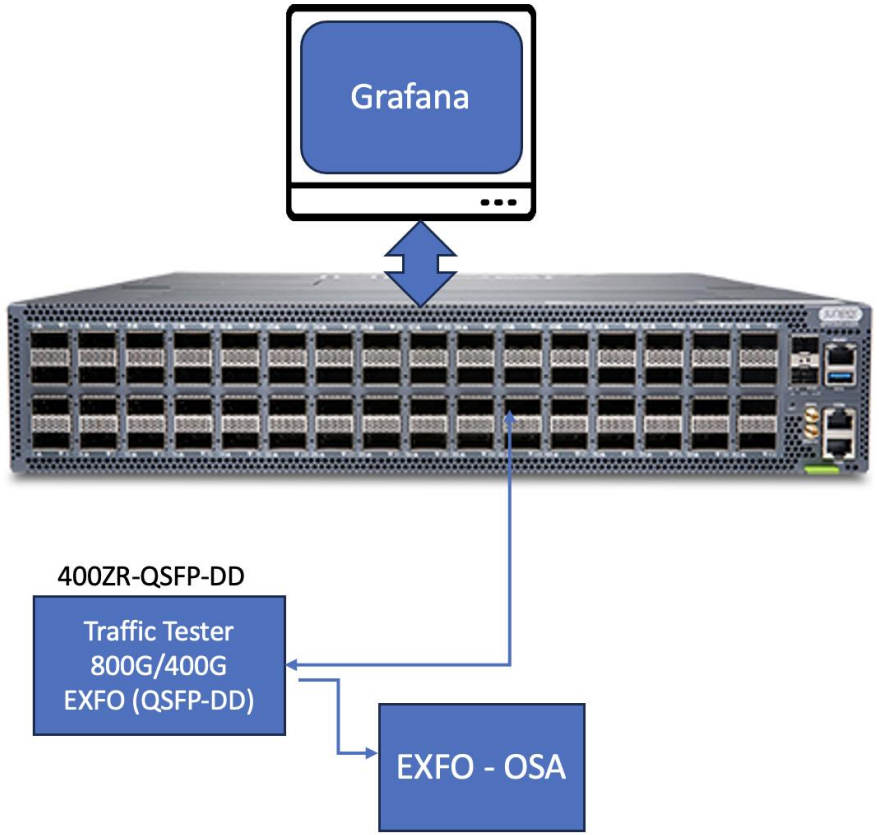
CMIS Demo Overview – OFC 2025

- 1 switch/router vendor – Juniper Networks
- 3 test equipment vendor – EXFO, MultiLane, Wilder Technologies
- 10 module vendors – Accelight, Astera Labs, Ciena, Cisco, HG Genuine, Hisense Broadband, Infinera, Juniper Networks, Lessengers, TE Connectivity
- Interface reaches ranging from passive copper to coherent – 400GbE & 800GbE support
- 2 form-factors – QSFP-DD/OSFP
- CMIS versions – CMIS 4.0, 5.0, 5.1, 5.2

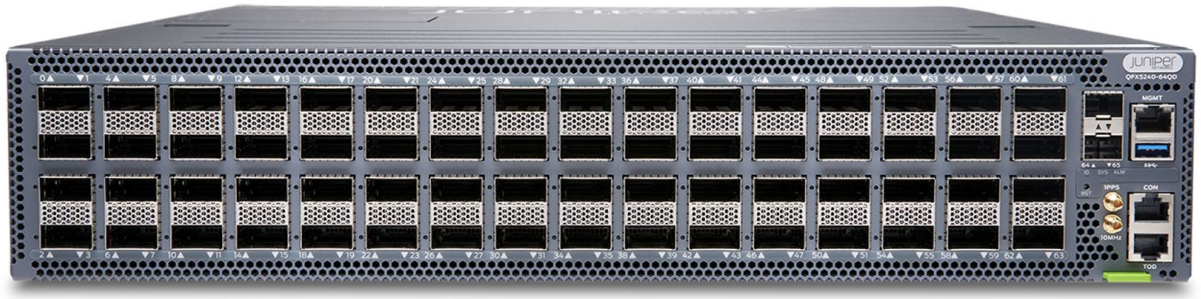
One common management platform - CMIS

Demo A - Multi-vendor interop through CMIS

- ***Multi-vendor interop. through Common Management Interface Specification (CMIS)***
- Routers/Pluggables/Test & measurement equipment under common management
- Demo content:
  - CMIS module inventory – CMIS revision, Module type advertiseme
  - Application advertisement & Selection ***(AppSel)***
    - CMIS standard application advertisement & selection
      - 400G and 800G plugs including LPO (LRO) modules
  - CMIS standard DWDM optics control features:
    - *CMIS **Channel selection** / CMIS **Tx output power adjustment***
  - MSM/DPSM
    - CMIS standard module bring-up with MSM/DPSM
  - *VDM (Versatile Diagnostics Monitoring)*
    - *CMIS **VDMs** for performance monitoring – DWDM modules*
  - *CDB (Common Data Block) for messaging between host and modul*
    - *FW update*



Demo A - Port Configuration (all 800G)



Juniper QFX5240-64OD

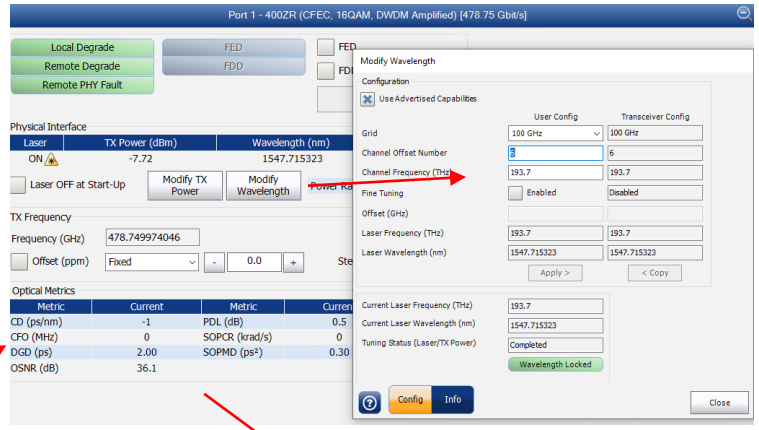
- 4 CMIS versions (rev 4.0 ~ 5.2)
- 9 Module types (including LPO/LRO)
- 17 ports populated
- 8 OIF member participants

													ZR		ZR
	DAC		AEC		2xSR4		AOC		2xDR4			2xFR4		AOC	
QFX5240-64OD	0	4	8	12	16	20	24	28	32	36	40	44	48	400ZR	56	800ZR
Module Type	DAC	DAC	AEC	AEC	2xSR4 (LPO)	2xSR4 (LPO)	2xSR4 (LRO)	AOC	AOC	2xDR4	2xDR4 (LPO)	2xDR4 (LPO)	2xFR4 (LPO)	53	AOC	AOC
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62
	3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63

QFX5240-64OD	0	4	8	12	16	20	24	28	32	36	40	44	48	Cisco	56	Nokia
Vendor Name	TE	TE	TE	TE	Hisense	Lessengers	Lessnegers	TE	TE	Accelight	HG Genuine	Hisense	Hisense	53	Juniper	Juniper
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62
	3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63

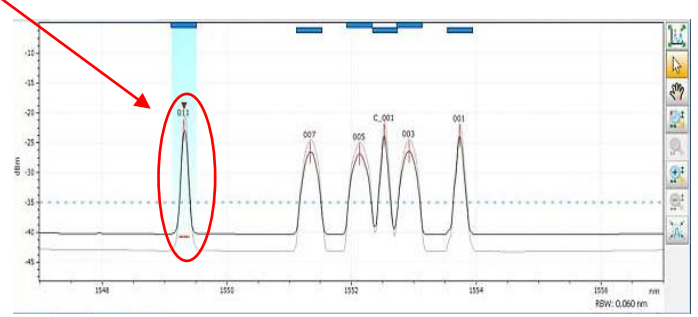
QFX5240-64OD	0	4	8	12	16	20	24	28	32	36	40	44	48	50	56	60
Port assignment	1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62
	3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63

Demo B - Wavelength Tuning “a la carte”



EXFO BERT

EXFO OSA



DEMO outlines:

- Real-time display and communication of participant coherent transceiver optical parameters
- Live demonstration of wavelength tuning adjustments supported by the transceiver
- On-the-spot validation of amplitude and OSNR
- Direct correlation between transceiver OSNR metrics and data from the optical spectrum analyzer

Demo C - Module Firmware Management

CMIS & OIF provides a consistent definition to manage advanced Module Firmware in disaggregated environments.
Firmware releases add features, interoperability capabilities and maintenance releases independently from Host NOS updates.

Supported CMIS operations:

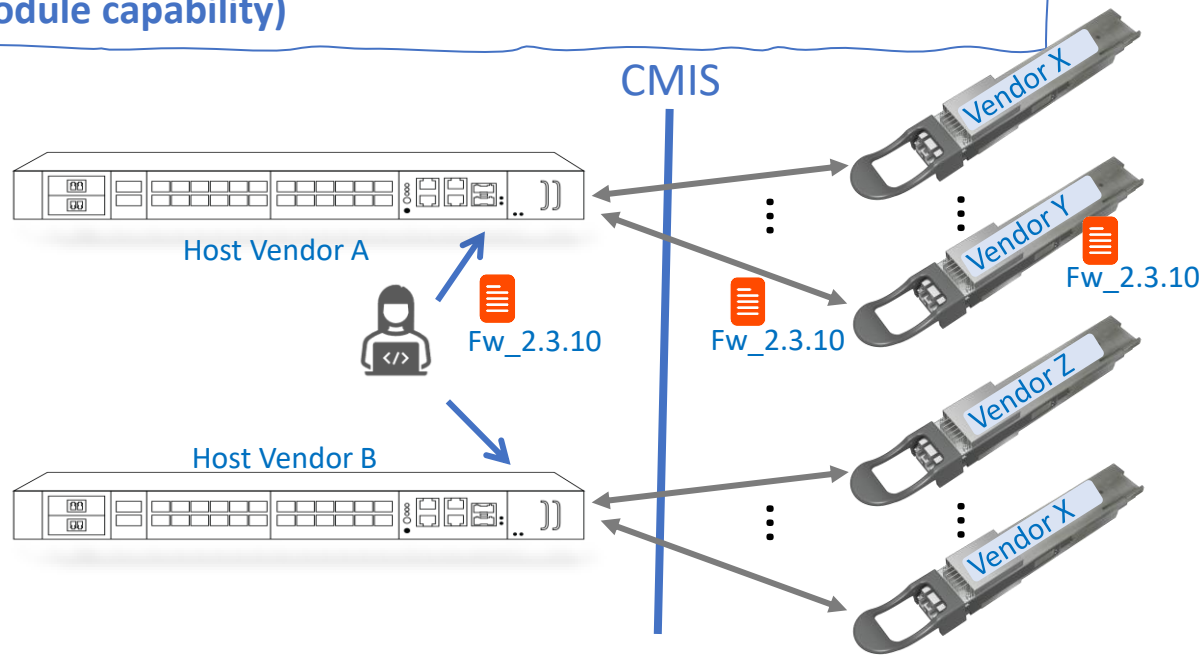
- **Module inventory and identity**
- **Firmware revision (Major#.Minor#.BuildNum#)**
- **Status of Active and Standby FW image banks**
- **Switchover to standby bank (inactive bank)**
- **Non-service affecting "Hitless" firmware updates (dependent upon module capability)**

```
# show transceiver firmware status slots all
Slot   Active Firmware                 Inactive Firmware
4/1    3.1.23 (image A, committed)     3.1.25 (image B)
4/8    2.3.9  (image B, committed)     2.3.0  (image A)
5/1    1.3.15 (image B, committed)     n/a
5/26   6.2.87 (image A)                6.2.13 (image B, committed)
```

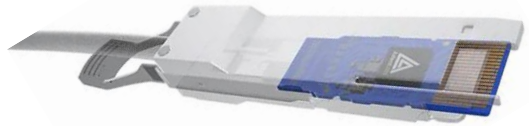
```
# transceiver firmware update slot 4/8 image /tmp/fw_2.3.10.bin
```

```
# transceiver firmware activate-standby slot 4/8
```

```
# show transceiver firmware status slots 4/8
Slot   Active Firmware                 Inactive Firmware
4/8    2.3.10 (image A, committed)     2.3.9  (image B)
```



Demo D - CMIS Out of Band Link Training



Astera Labs AEC Module

PRBS generator

RxFFE

Rx

Micro Controller

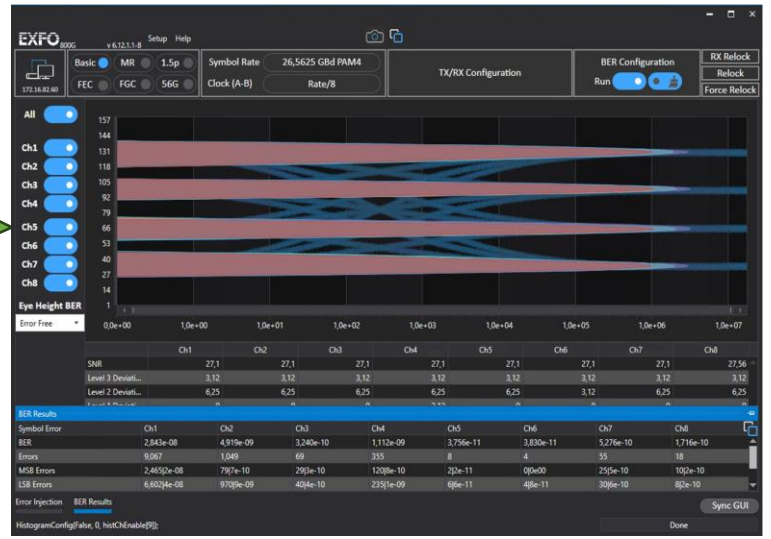
CMIS

Wilder 800G OSFP MCB

Wilder 224G ISI Channel Board

Rx

EXFO BA-4000 BERT

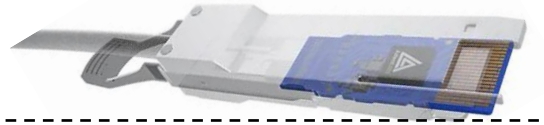


Laptop

This half of the CMIS OOB (Out Of Band) Link Training demo is showcasing:

- BERT + MCB + Laptop emulate a Host receiver
- Laptop reads BER from module RX direction to assess signal quality
- CMIS LT used to cycle module RX direction Equalization presets to select presets that gives best BER

Demo D - CMIS Out of Band Link Training



Astera Labs AEC Module

PRBS generator

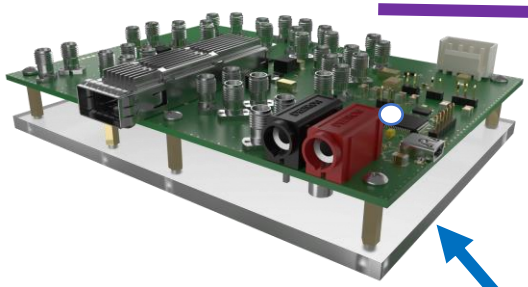
RxFFE

Rx

Micro Controller

Module to Host CMIS Link Training

Multilane OSFP MCB



800GAUI-8 (Rx)

Multilane BERT RX

BER/SNR

CMIS

This Demo shows Module to Host link training (preset selection and iterative tuning)

CMIS-LT GUI cycles through RX equalization presets of the AEC module to select the preset with best BER/SNR for each channel.

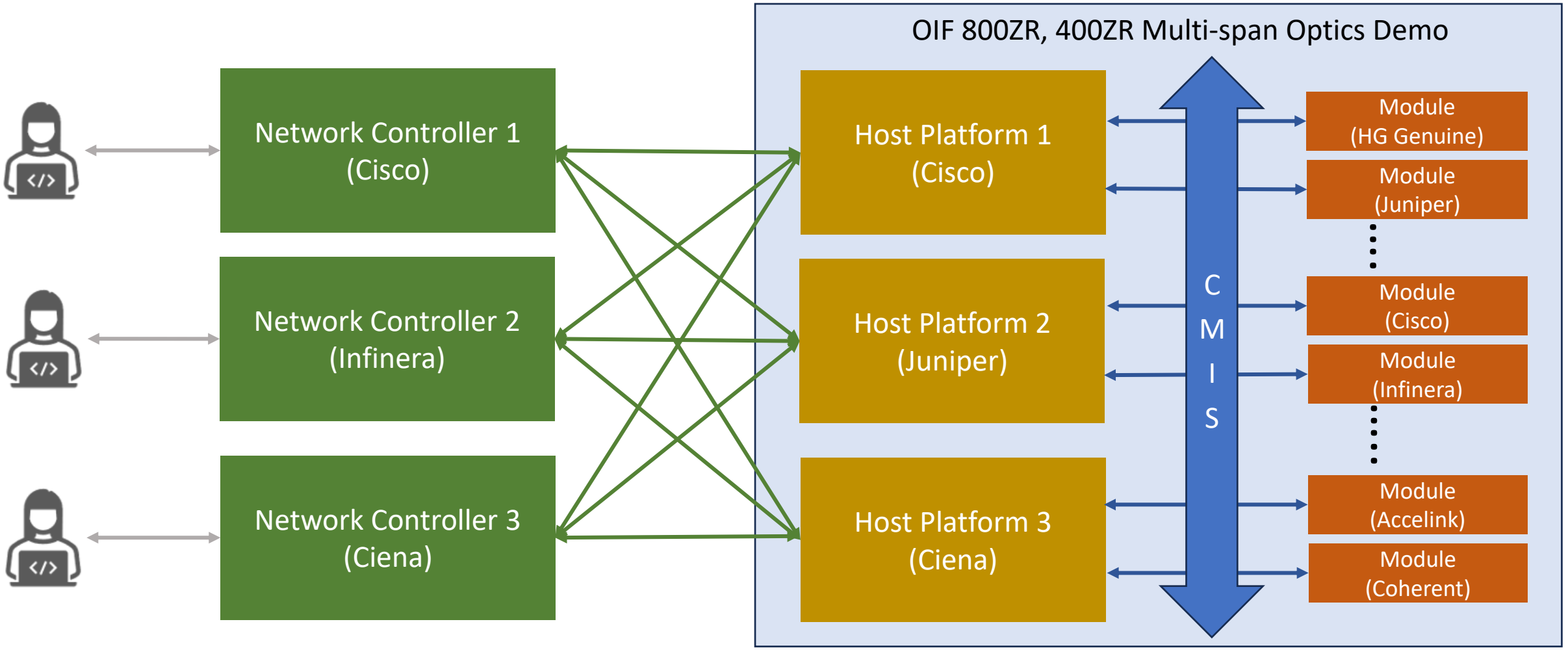
When none of the presets are good enough it continues to iterative tuning to find optimal RX equalization that leads to optimal BER per channel.

Demo Content :

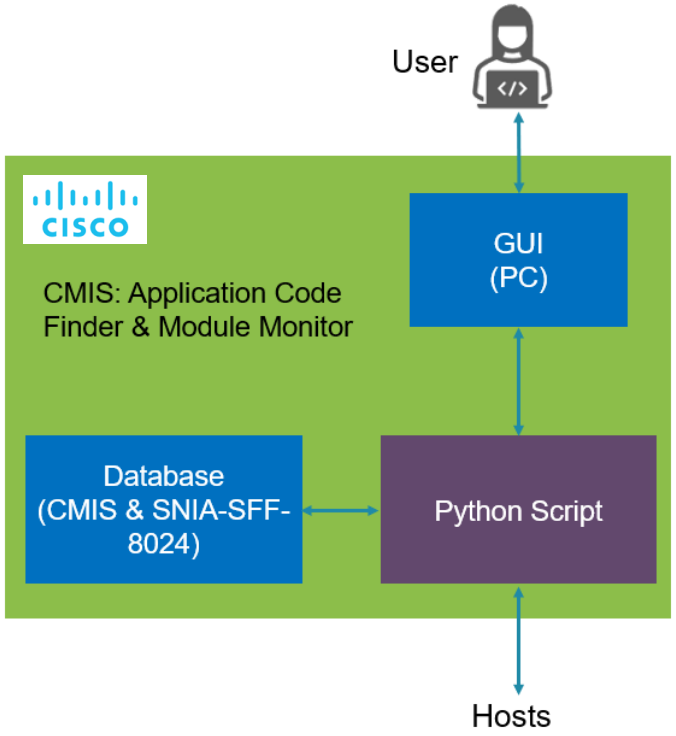
- Multilane OSFP MCB, BERT and CMIST-LT MCB engine (emulating a CMIS Host)
- Astera Labs AEC module

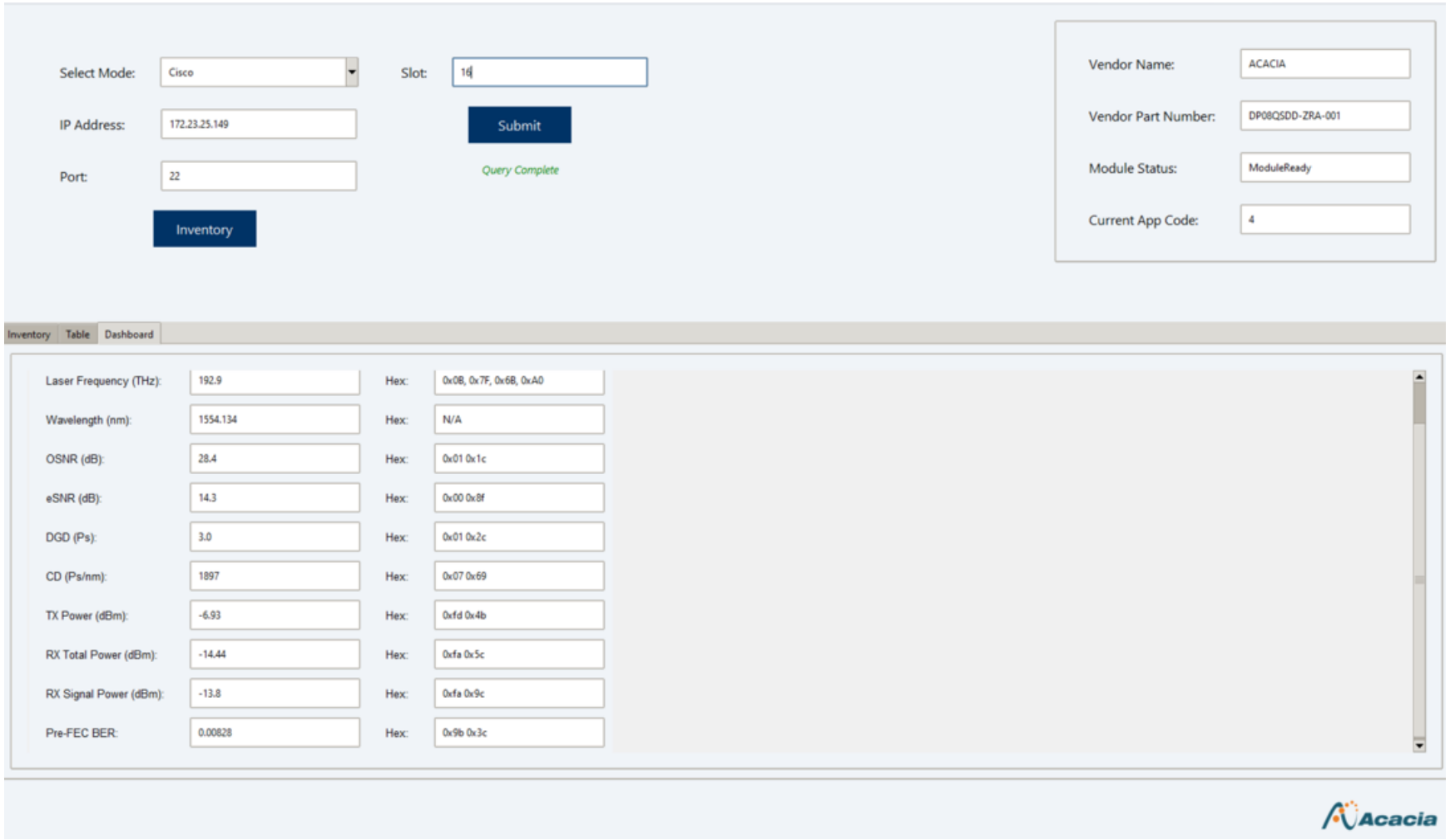
Demo E - CMIS enabling Multi Vendor Disaggregation

CMIS provides consistent definitions and access to optical functions.



Demo E - CMIS in Live Multi-Vendor Optics Demo

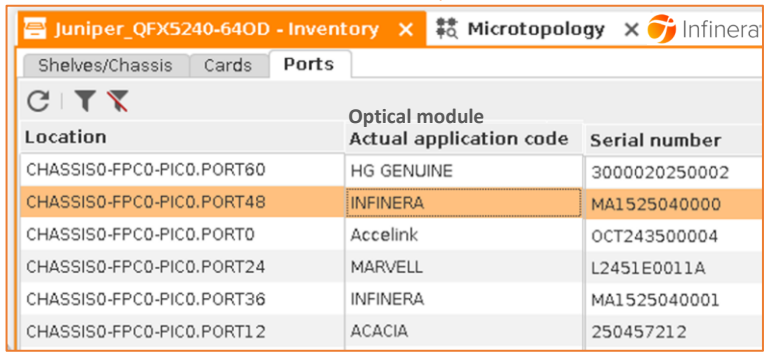




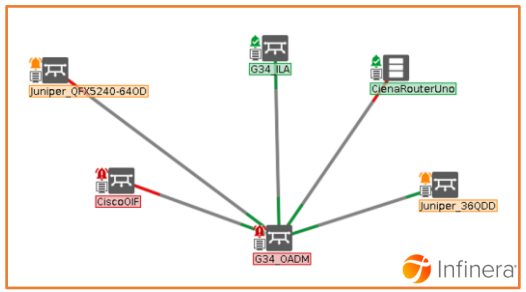
Demo E - CMIS in Live Multi-Vendor Optics Demo

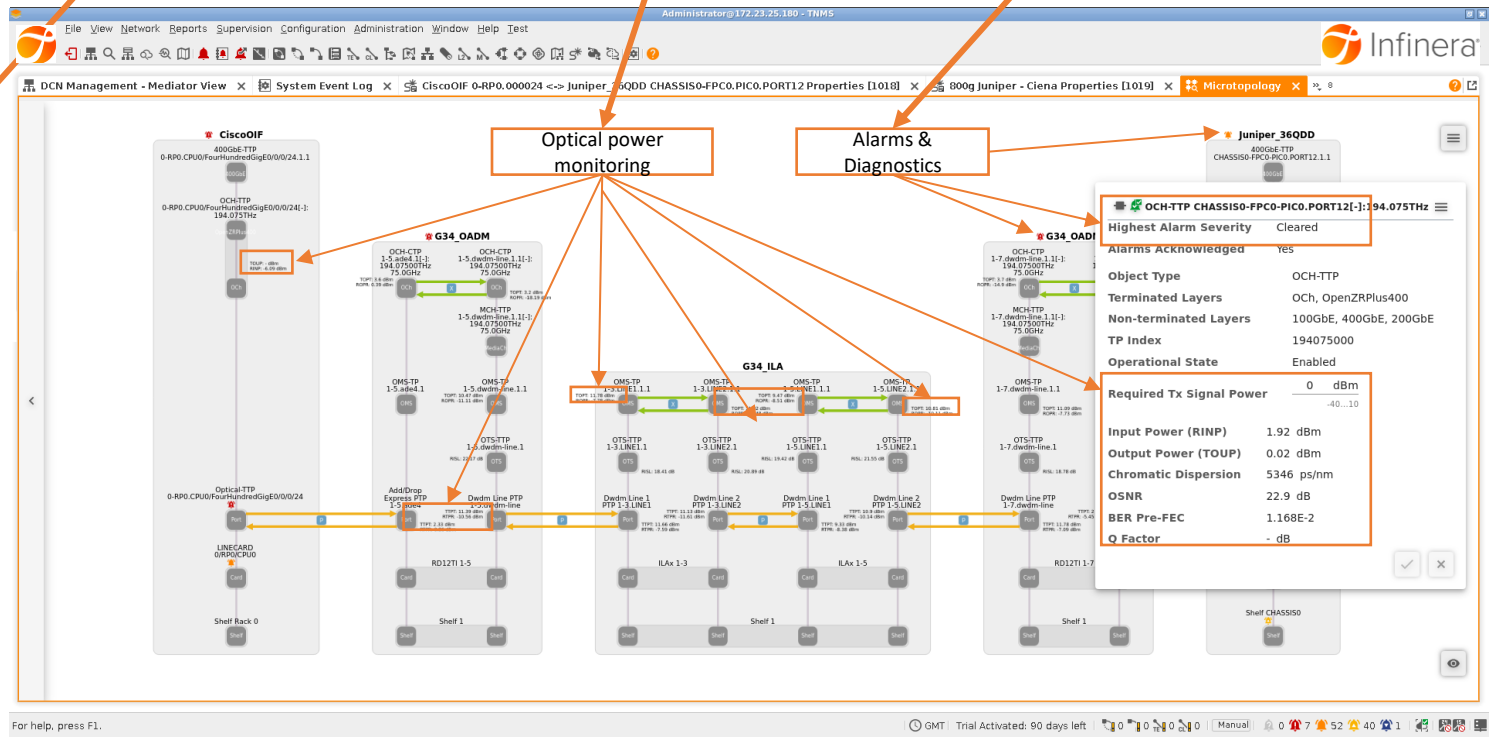
- **CMIS & OIF** provide a consistent definition of **advanced Optical modules for disaggregated host and module environments**.
- **OpenConfig and CLI** provide optical information thru Host Northbound APIs.

Optical Controller (Open Wave Manager) combines ***Optical module info*** *(via host API)* and ***Optical Line info*** for multi-layer topology discovery & management.
CMIS enables optical layer management including Inventory, Advanced Optical configuration, Optical power monitoring and Optical layer troubleshooting.



Location	Optical module Actual application code	Serial number
CHASSIS0-FPC0-PIC0.PORT60	HG GENUINE	3000020250002
CHASSIS0-FPC0-PIC0.PORT48	INFINERA	MA1525040000
CHASSIS0-FPC0-PIC0.PORT0	Accelink	OCT243500004
CHASSIS0-FPC0-PIC0.PORT24	MARVELL	L2451E0011A
CHASSIS0-FPC0-PIC0.PORT36	INFINERA	MA1525040001
CHASSIS0-FPC0-PIC0.PORT12	ACACIA	250457212





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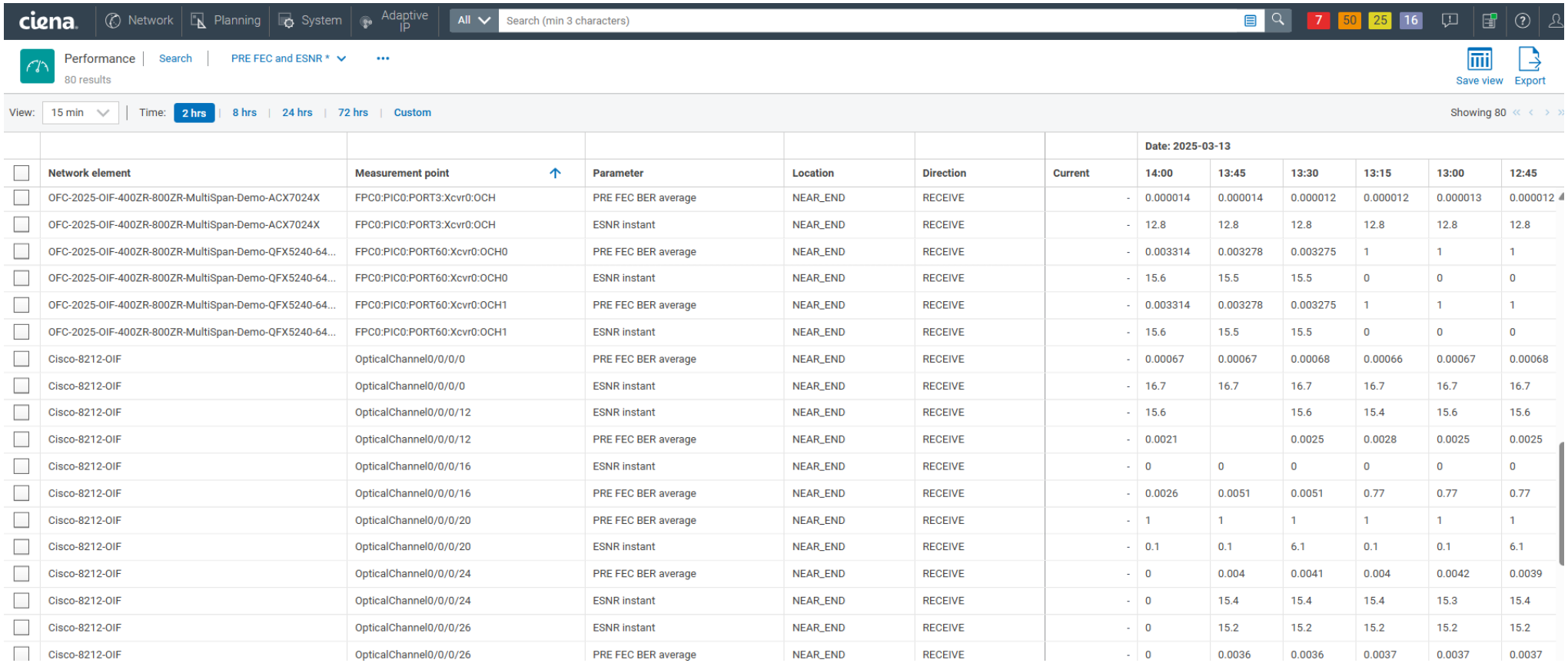


							Date: 2025-03-13					
Network element	Measurement point	Parameter	Location	Direction	Current	14:00	13:45	13:30	13:15	13:00	12:45
OFC-2025-OIF-400ZR-800ZR-MultiSpan-Demo-ACX7024X	FPC0:PIC0:PORT3:Xcvr0:OCH	PRE FEC BER average	NEAR_END	RECEIVE	-	0.000014	0.000014	0.000012	0.000012	0.000013	0.000012
OFC-2025-OIF-400ZR-800ZR-MultiSpan-Demo-ACX7024X	FPC0:PIC0:PORT3:Xcvr0:OCH	ESNR instant	NEAR_END	RECEIVE	-	12.8	12.8	12.8	12.8	12.8	12.8
OFC-2025-OIF-400ZR-800ZR-MultiSpan-Demo-QFX5240-64...	FPC0:PIC0:PORT60:Xcvr0:OCH0	PRE FEC BER average	NEAR_END	RECEIVE	-	0.003314	0.003278	0.003275	1	1	1
OFC-2025-OIF-400ZR-800ZR-MultiSpan-Demo-QFX5240-64...	FPC0:PIC0:PORT60:Xcvr0:OCH0	ESNR instant	NEAR_END	RECEIVE	-	15.6	15.5	15.5	0	0	0
OFC-2025-OIF-400ZR-800ZR-MultiSpan-Demo-QFX5240-64...	FPC0:PIC0:PORT60:Xcvr0:OCH1	PRE FEC BER average	NEAR_END	RECEIVE	-	0.003314	0.003278	0.003275	1	1	1
OFC-2025-OIF-400ZR-800ZR-MultiSpan-Demo-QFX5240-64...	FPC0:PIC0:PORT60:Xcvr0:OCH1	ESNR instant	NEAR_END	RECEIVE	-	15.6	15.5	15.5	0	0	0
Cisco-8212-OIF	OpticalChannel0/0/0/0	PRE FEC BER average	NEAR_END	RECEIVE	-	0.00067	0.00067	0.00068	0.00066	0.00067	0.00068
Cisco-8212-OIF	OpticalChannel0/0/0/0	ESNR instant	NEAR_END	RECEIVE	-	16.7	16.7	16.7	16.7	16.7	16.7
Cisco-8212-OIF	OpticalChannel0/0/0/12	ESNR instant	NEAR_END	RECEIVE	-	15.6		15.6	15.4	15.6	15.6
Cisco-8212-OIF	OpticalChannel0/0/0/12	PRE FEC BER average	NEAR_END	RECEIVE	-	0.0021		0.0025	0.0028	0.0025	0.0025
Cisco-8212-OIF	OpticalChannel0/0/0/16	ESNR instant	NEAR_END	RECEIVE	-	0	0	0	0	0	0
Cisco-8212-OIF	OpticalChannel0/0/0/16	PRE FEC BER average	NEAR_END	RECEIVE	-	0.0026	0.0051	0.0051	0.77	0.77	0.77
Cisco-8212-OIF	OpticalChannel0/0/0/20	PRE FEC BER average	NEAR_END	RECEIVE	-	1	1	1	1	1	1
Cisco-8212-OIF	OpticalChannel0/0/0/20	ESNR instant	NEAR_END	RECEIVE	-	0.1	0.1	6.1	0.1	0.1	6.1
Cisco-8212-OIF	OpticalChannel0/0/0/24	PRE FEC BER average	NEAR_END	RECEIVE	-	0	0.004	0.0041	0.004	0.0042	0.0039
Cisco-8212-OIF	OpticalChannel0/0/0/24	ESNR instant	NEAR_END	RECEIVE	-	0	15.4	15.4	15.4	15.3	15.4
Cisco-8212-OIF	OpticalChannel0/0/0/26	ESNR instant	NEAR_END	RECEIVE	-	0	15.2	15.2	15.2	15.2	15.2
Cisco-8212-OIF	OpticalChannel0/0/0/26	PRE FEC BER average	NEAR_END	RECEIVE	-	0	0.0036	0.0036	0.0037	0.0037	0.0037

This demo is showcasing:

- CMIS monitoring parameters (Pre FEC BER and ESNR)
- Monitoring different module vendors in different host platforms

CMIS – A Family of Documents

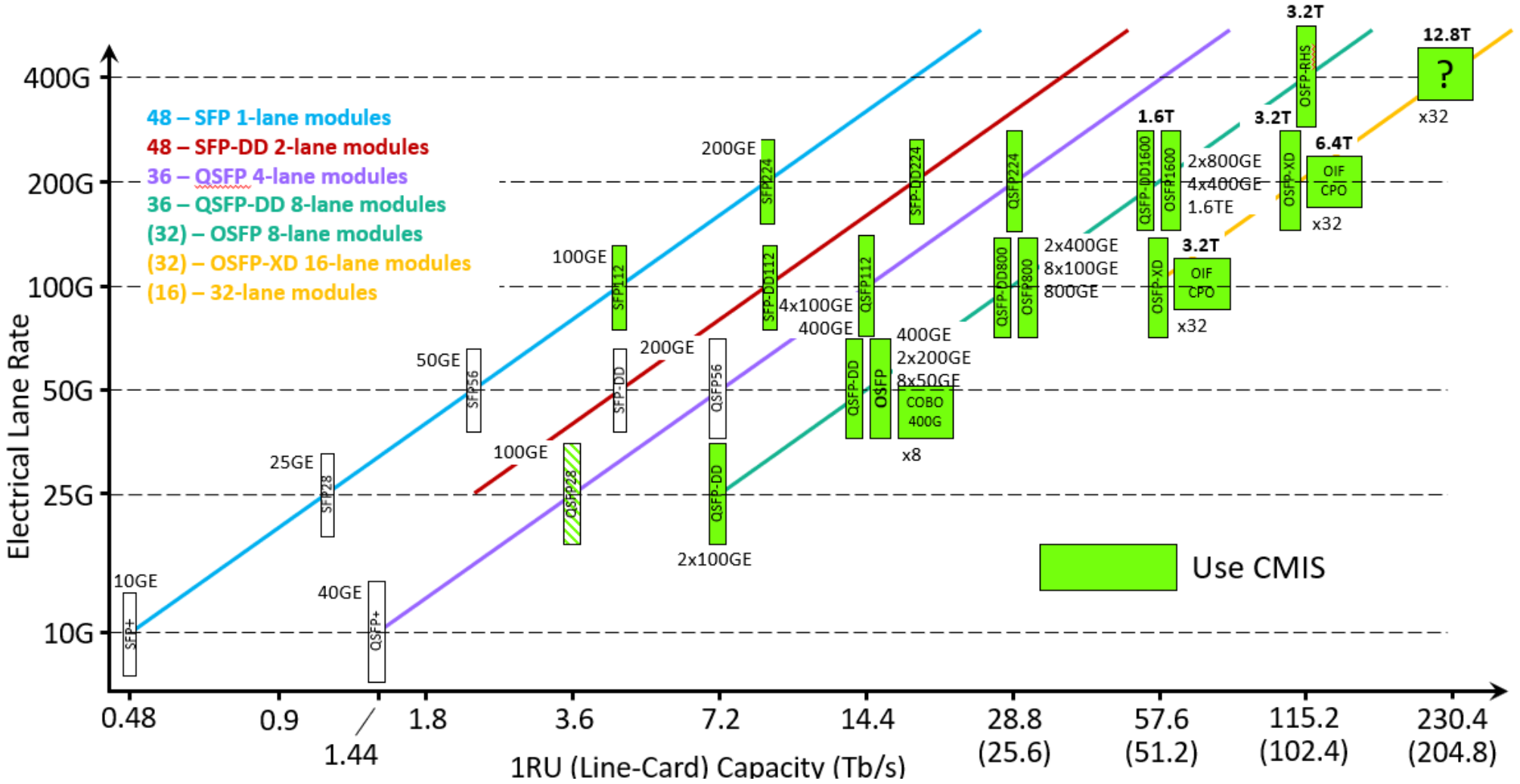
CMIS (Common Management Interface Specification) IA - Current Rev 5.3

CMIS IA is the foundation for the plug-and-play and has a family 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 (e.g. LPO)

CMIS works in conjunction with other industry standards like SNIA SFF-8024 and hardware MSAs.
*Some CMIS extensions are under development and have not been published yet.

CMIS - Widescale Form-Factor Adoption



What's next for CMIS?

- Enhanced management for module firmware updates
- Higher speed management interfaces (e.g. I3C, E-SGMII)
- Support for LPO modules (CMIS-VCS)
- Support for Intra-Sublayer Link Training (802.3 ILT)
- What do you want ?

OIF

PLL INTEROP DEMO

OFC 2025

SCAN ME