The Journey to Terabit Transport Solutions

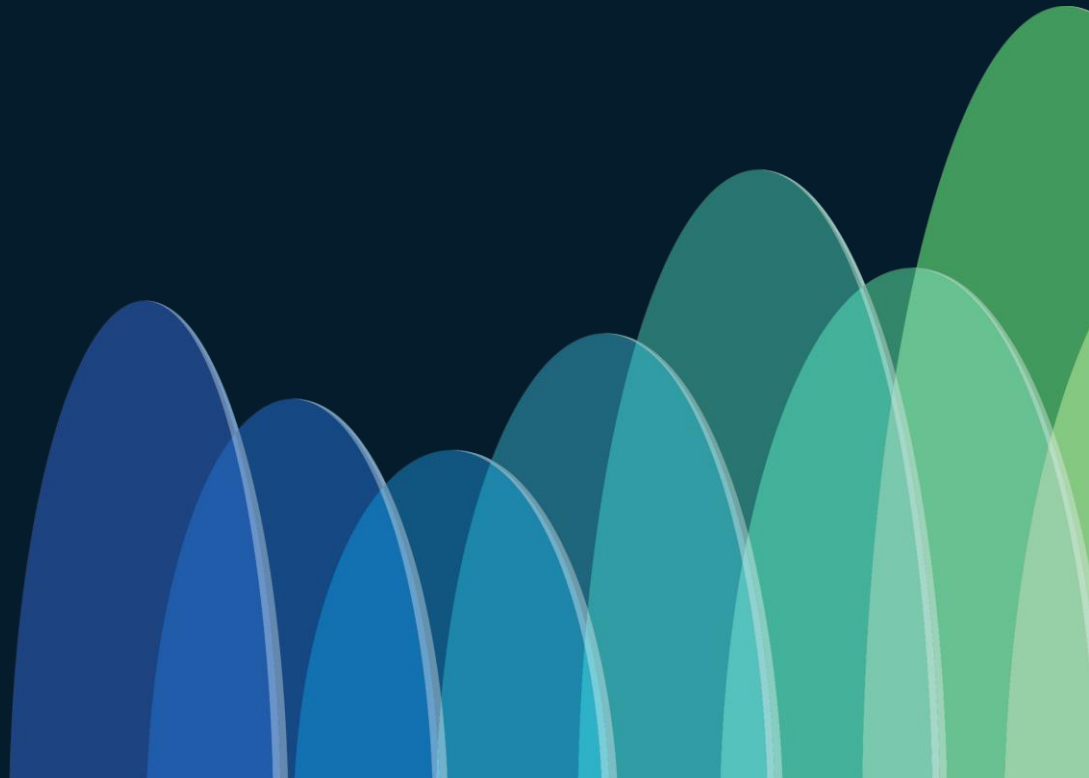
Lorenzo Ghioni – Sr. Director Product Management
@GhioniLorenzo
Maurizio Gazzola – Head Optical Architect
@GazzolaMaurizio

BRKOPT-2019

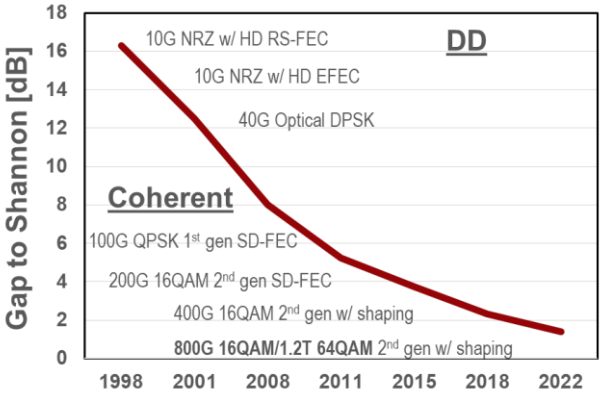
Agenda

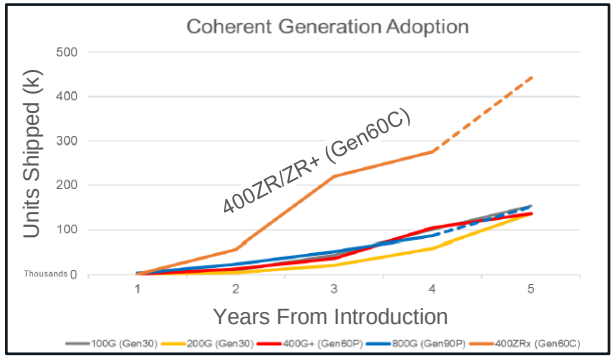
- Optical Market Trends
- Terabit Era Automation in Transport OLS Systems
- Performance optimized 1.2T Wavelengths
- Coherent DCO Evolution toward 1.6T Wavelengths
- Sustainable Technology Innovation
- Conclusion

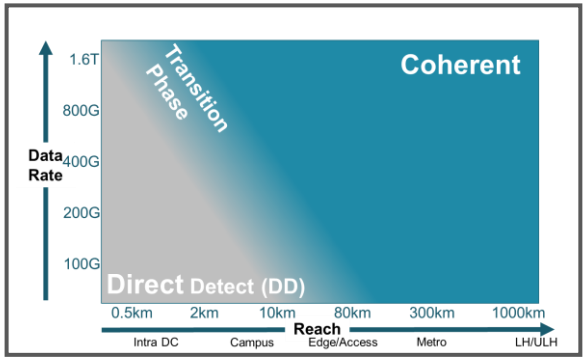
Optical Market Trends



Coherent Transport Evolution





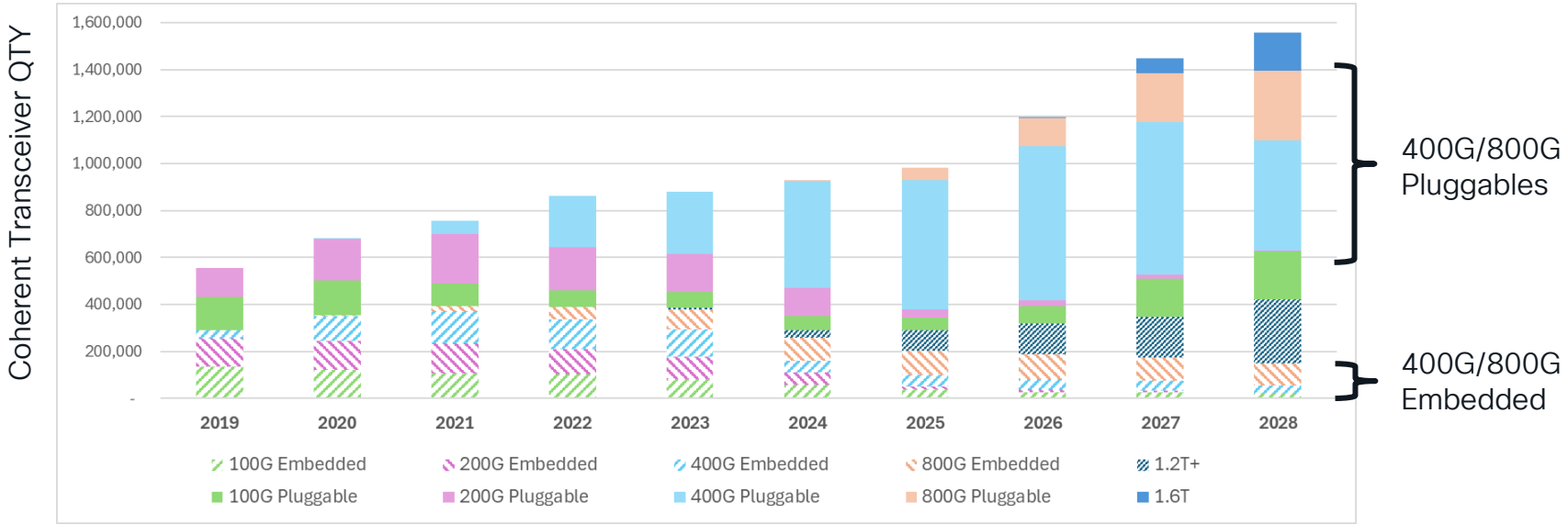


- Approaching Shannon Limit
  - Incremental improvements in Spectral Efficiency
  - Ongoing investment driven by cost reduction
- 400ZRx exceeding expectations
  - Fastest coherent product ramp ever
  - Gaining share in Metro/Edge DCI
- Coherent moving to shorter reach applications
  - Higher volume
  - Interoperable
  - Pluggable

High-volume standardized applications will drive next-generation industry investment

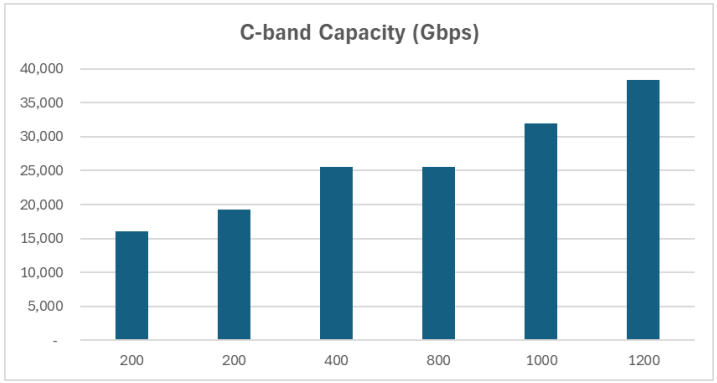
Pluggable Coherent Optics Role

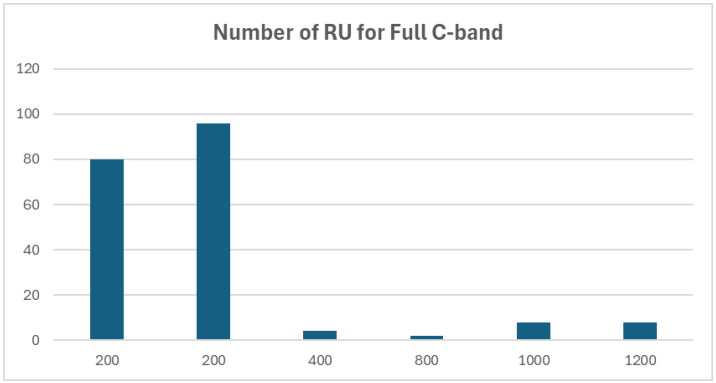
- **56%** of Coherent Transceivers were Pluggables in 2023 – **73%** in 2028
- Advantages of Pluggables: Multi-vendor, Interoperability, Pay-as-you-grow, Cost



Source: Cignal AI – Optical Component Report – Sep 2024

DCOs Impact on Fiber Capacity & System Density





- Moving from Fixed 50GHz (80-WXC) to FlexSpectrum (FS-SMR) allows to increase by 20% the overall fiber capacity, without having to deploy L-band
- Introducing 400G (or 800G) DCOs allows to increase by 60% the overall fiber capacity & to reduce the number of RU by 95% (by 98% with 800G)
- Introducing CIM 8 @ 1Tbps allows to double the overall fiber capacity (+140% using it @ 1.2Tbps) and to reduce the number of RU by 90%

Open Networking

OPEN LINE SYSTEMS

Any vendor coherent transponder or spectrum connects into Line System

ALL Cisco Line Systems are OPEN

OPEN COHERENT INTERFACES

Interoperable standards-based coherent DWDM interfaces supported in MSA standard form-factor

Open ROADM

OIF

OpenZR+

Cisco committed to driving OPEN standards

OPEN MANAGEMENT

Vendor Neutral device management
Multi-layer, Multi-domain, Multi-vendor management

ONF

IETF

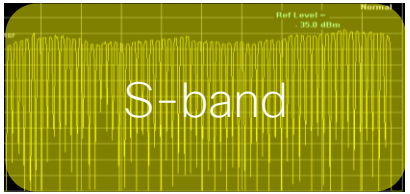
OPENCONFIG

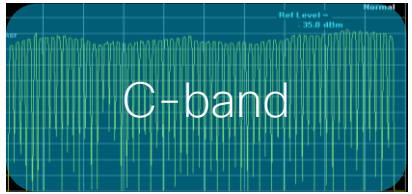
TELECOM INFRA PROJECT

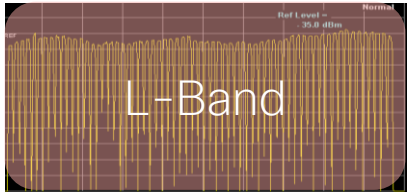
Cisco participating in key forums & developing MGMT support

More Capacity?

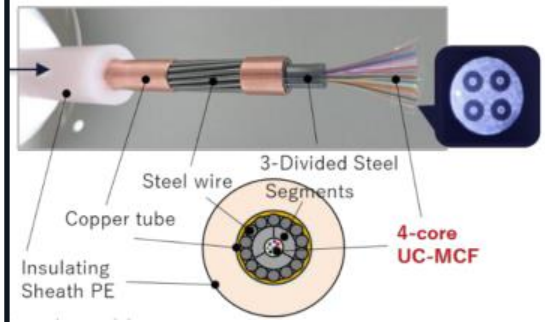
1 More Bands







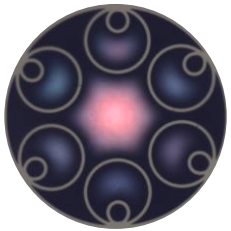
2 More/New Fiber

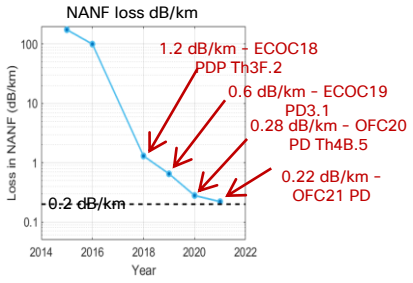


Nakamura et al – NEC SubOptic 2023

5,350km recirculating loop measurement at 200G/75GHz 2.67bits/s/Hz with 4C-MCF

Multi Core Fiber (MCF)





Inter modal interference (IMI) performance has been improving – estimated ~45dB/km to ~55dB/km as of 2021

Poggiolini et al – OFC 2021

GMI of 3.55 bits/symb over 5,750km

Hollow Core Fiber (HCF)

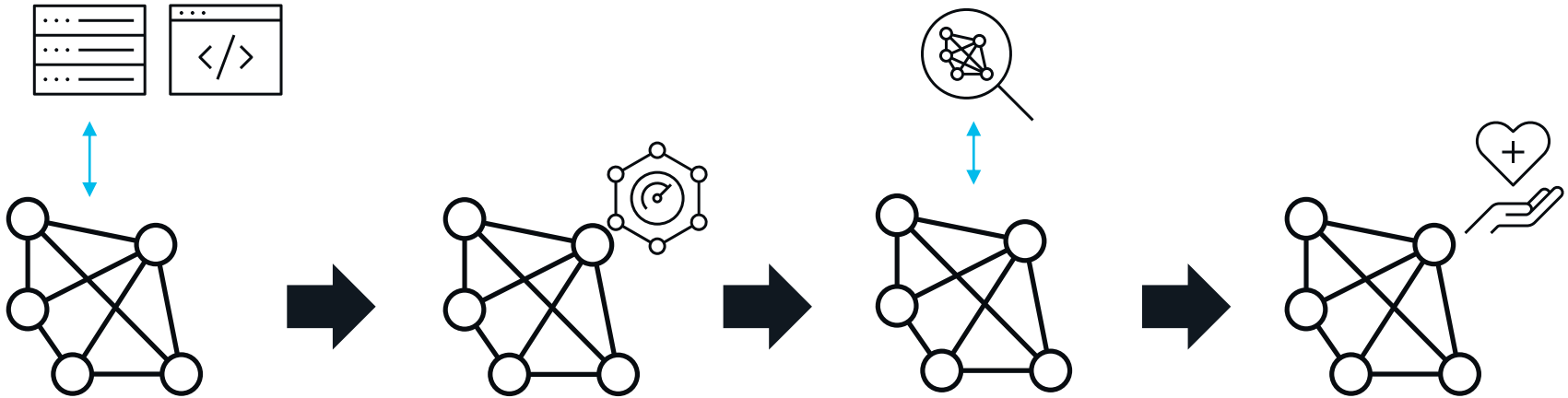
More Automation?

SW Install and Configuration Deployment Automation

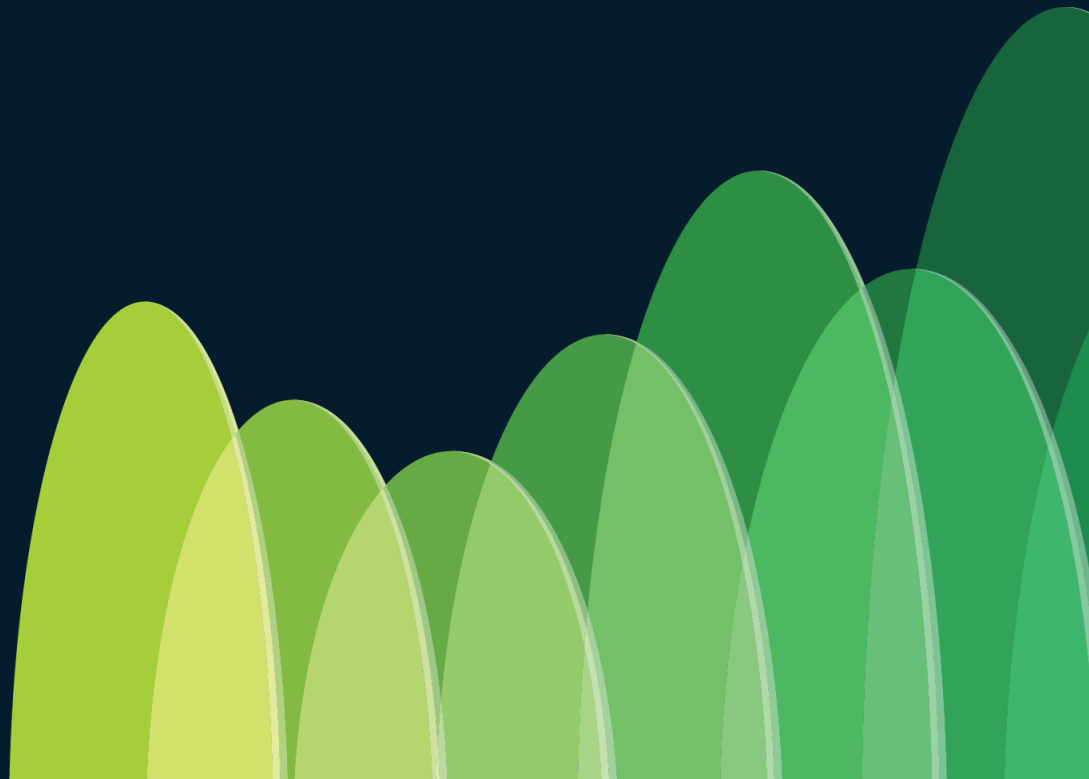
Link Turn-up at Optimal Performance, Built-in Fiber Checks, Automatic Power Control

Fine grained Visibility & ast failure isolation – transient detection, probe channels, high-resolution OCM, SW health checks, OTDR

Auto-remediation with RMA Automation & simpler RMA process - integrated LCs, headless mode, redundant SSDs



Terabit Era Automation in Transport OLS Systems



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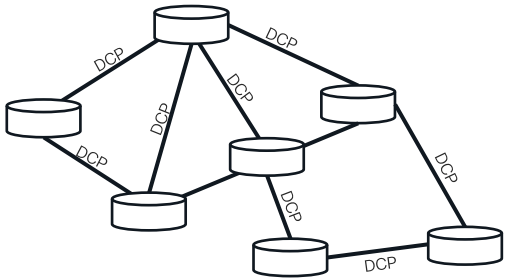
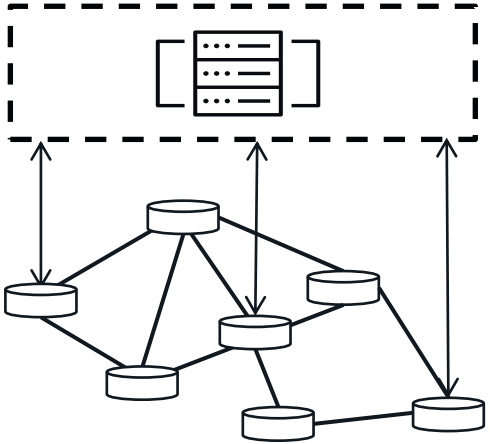
Control Plane Evolution

Distributed Control Plane

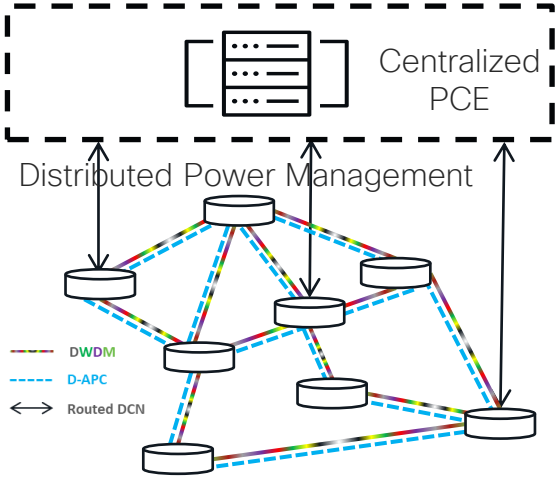


OR

Centralized Control Plane



Hybrid Approach



Better Resiliency?

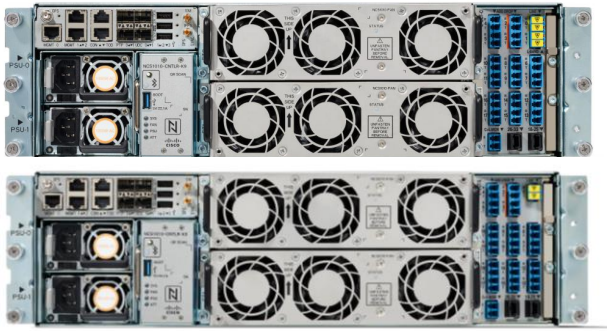
Better Scale?
Better Automation?

Optimal combination of Resiliency, Scale, Automation

Cisco NCS 1010 Open Line System

- Universal Form Factor
  - 3RU, 19” wide, 300mm deep Box
- Simple Pre-configured Chassis
  - ROADM Degree / Terminal
  - Optical Line Amplifier
- Flexible Platform
  - C-band only or C&L-band
  - EDFA only or EDFA+Raman
- Defined with Automation in mind

The Perfect Balance between Integration & Separation



- Integrated Line Cards
  - Better MTBF, fewer Field errors
- Cookie Cutter Approach
  - One Line Card per Shelf and one Shelf variant for All sites
- Dedicated C-Band & L-Band Shelves
  - Defer cost of L-Band day-1
  - Bands operate mostly independent of each other – better reliability.
- NTA upgrade from C-band to C&L-band

ROADM Degree / Terminal (OLT) Integration Details

Raman C+L

OSC

Channelized ASE loading

OCM

C+L-Band combiner

OTDR

33-port Twin WSS

Connection Verification

Pre- and Booster EDFA

Ingress EDFAs for ZR

In-Line Amplifier (ILA) Integration Details

=

Raman C+L

OSC

Switchable Gain EDFA w/DGE

OTDR

C+L-Band combiner

+

Raman C+L

OSC

Switchable Gain EDFA w/DGE

OTDR

C+L-Band combiner

Optical Automation

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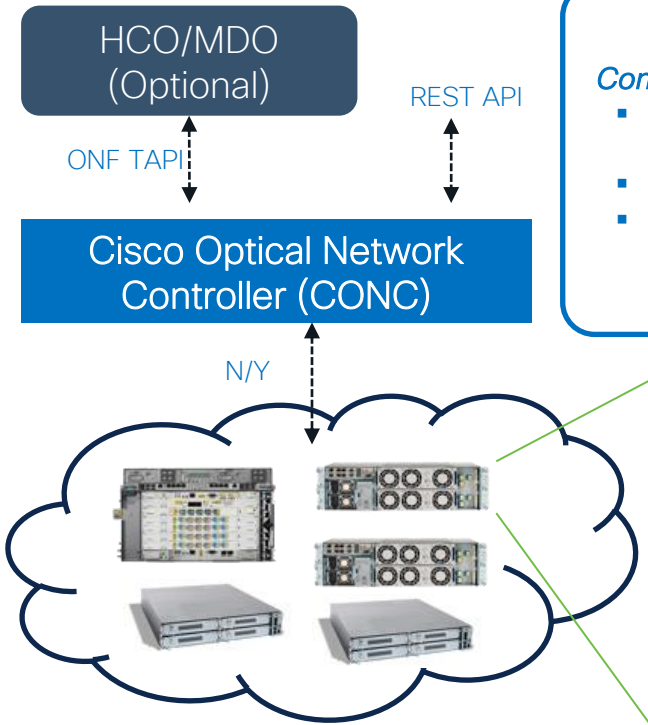
Optical Automation & Management – CONC & COSM



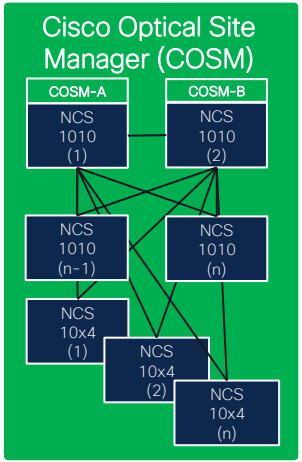
CONC-Cisco Optical Network Controller

Controller Interfaces

- NBI - TAPI integration w/ HCO (or 3rd party)
- NBI - REST API
- SBI – Netconf/YANG

CONC NMS/EMS Applications

- Enrollment (on boarding)
- Topology & Inventory
- Alarms & Alarm history
- Service Manager (Circuit discovery / provisioning)
- Service Assurance (Circuit data-path)
- Audit Logs & Workspace



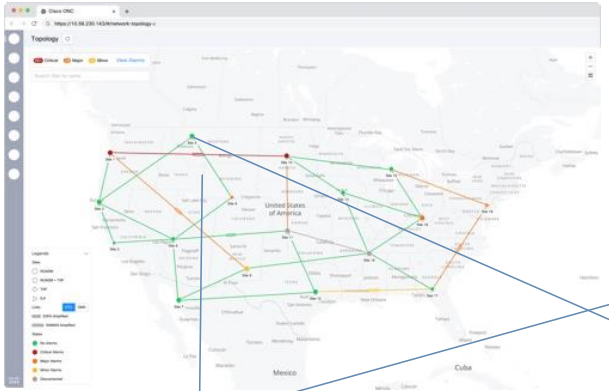
COSM-Cisco Optical Site Manager

Built into NCS1010 (or 1014) controller card

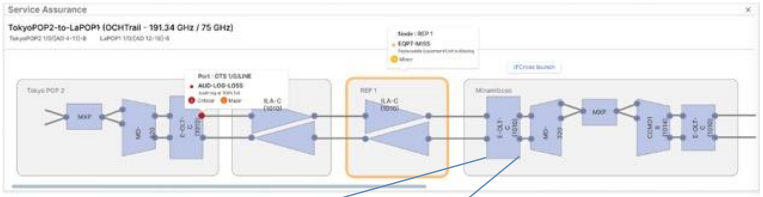
- Mechanical Layout & Inventory
- Alarm correlation & Notification
- Current PM up to last 32 bins
- OAM & Configurations
  - Card & Port configs
  - Connection Verification & Loopback
  - PRBS
  - OTDR
  - OCM
  - TSA

CONC – GUI Examples

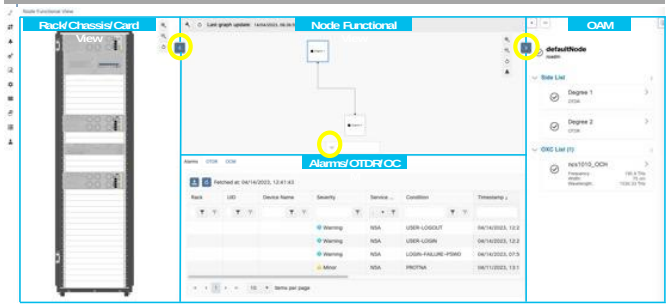
CONC - Topology view



CONC - Circuit view

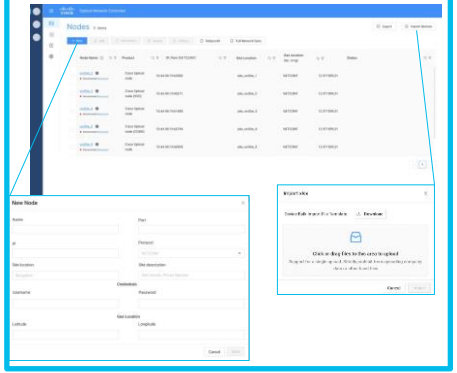


Site view

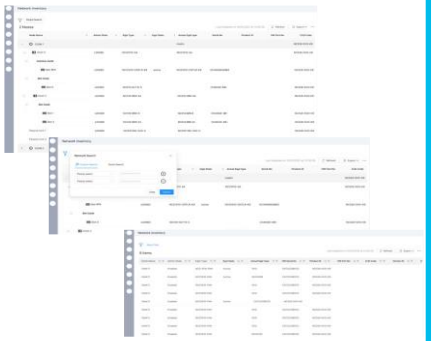


CONC - Applications

Enrollment

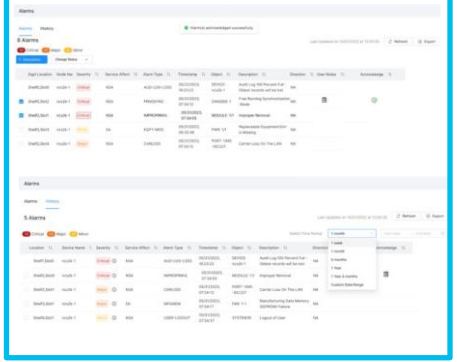


Inventory

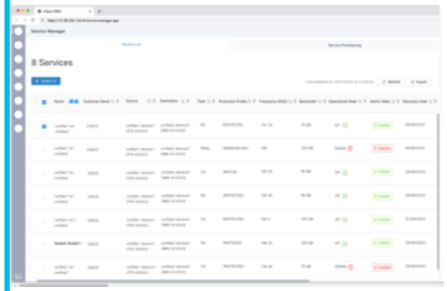


Topology

Alarms



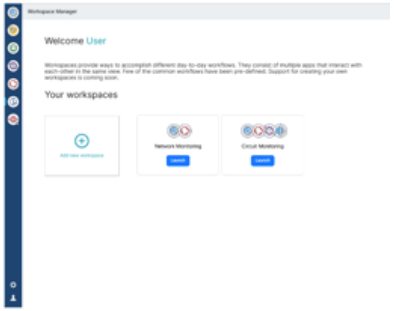
Service Manager



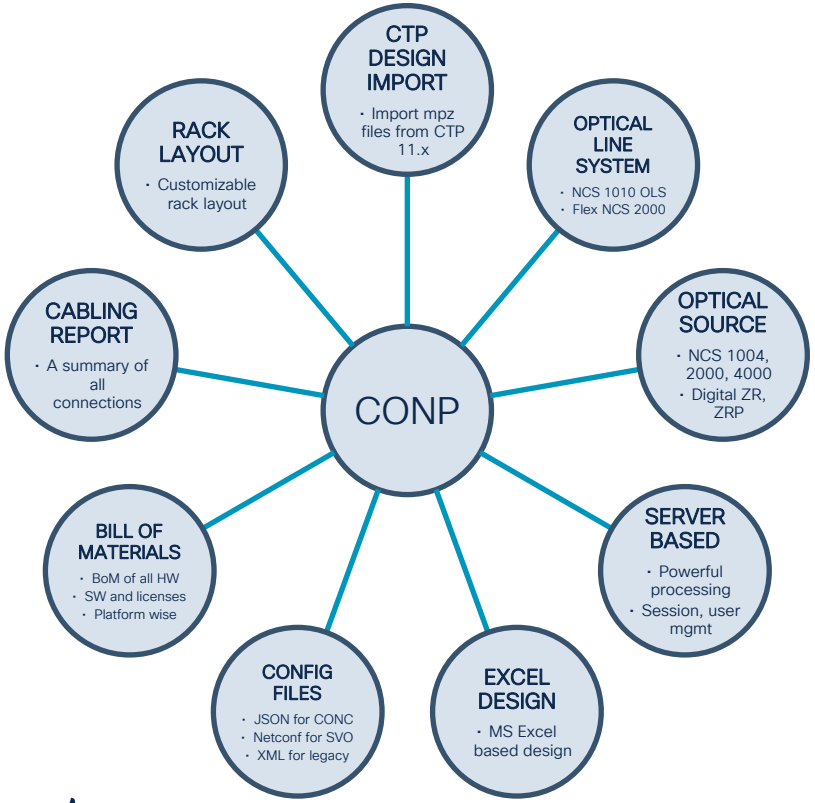
Service Assurance

Audit Logs

Workspace



Cisco Optical Networking Planner (CONP)



Network life cycle mgmt. design / plan tool

Single tool for all Cisco platforms

- NCS 1000
- NCS 2000
- NCS 4000

Model ANY WDM Interface

- Digital QSFP-DD & CFP2 ZR / ZR+ optics
- NCS 1004, NCS 2000, NCS 4000
- ANY optical source, Open Line System

Standard output data

- Bill of Materials
- Cabling reports
- Configuration files for installation

Failure-Restoration Analysis

AI Role for Optical Networking

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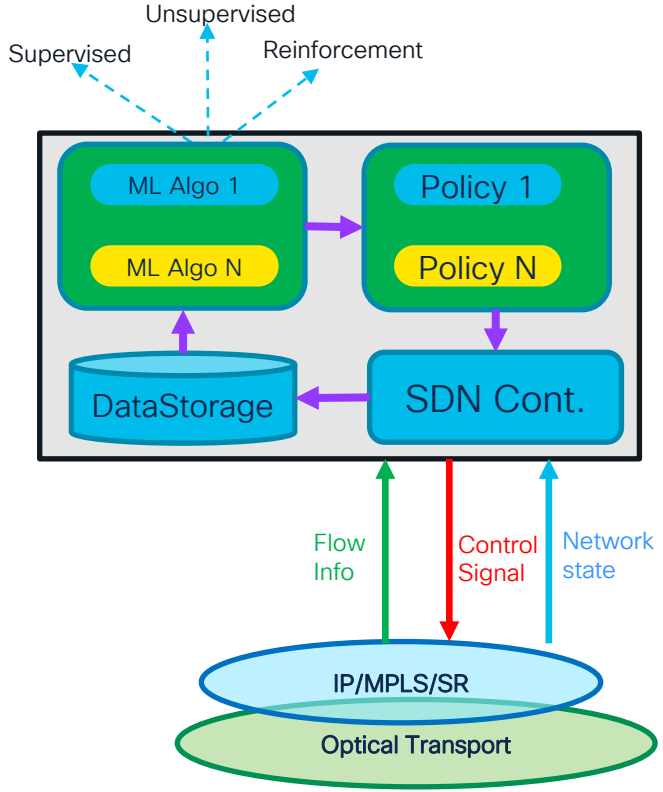
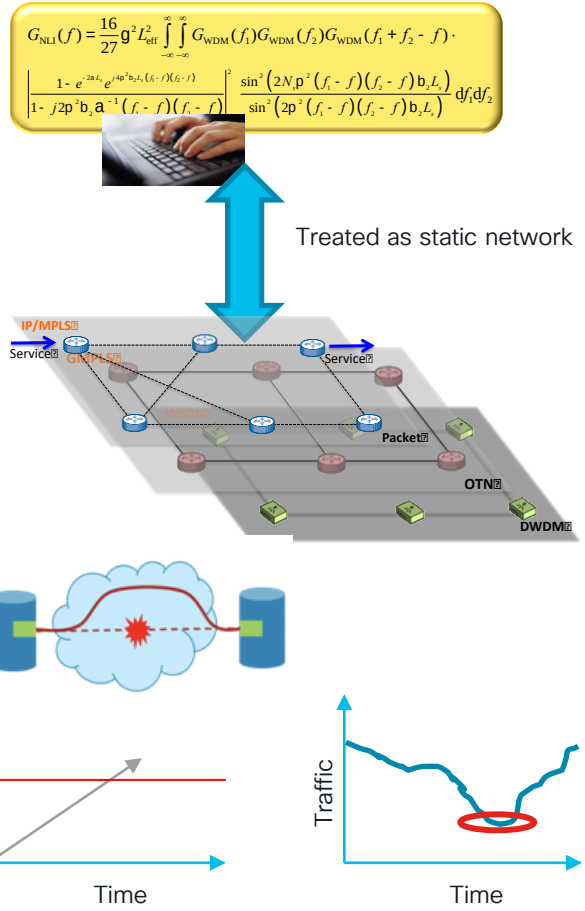
AI for Optical Networks: Cognitive Networks

- Cognitive Networks are an application of Artificial Intelligence (AI)
  - Collect, learn, plan, decide then act
- Machine Learning (ML) is a subset of AI – A machine can learn a behavior by having the correct data
  - Mathematical and Statistical tools
- SDN Frame opens the door to many network possibilities and benefits AI and ML
- There are all the pre-conditions to see benefits from ML



Possible Use Cases

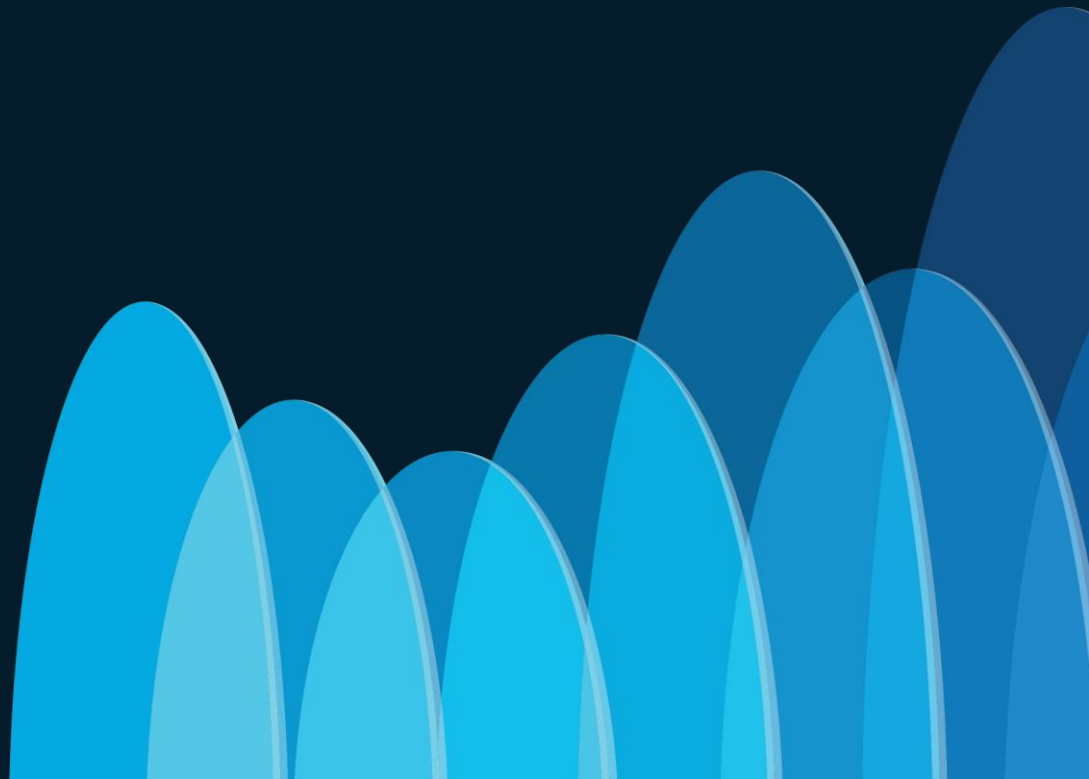
- Network Design, Planning and Optimization
  - Today we have dynamic network yet leverage static design tools
  - Predict QoT, Amp set points, Modulations, etc…
  - Minimize network margins and increase data rates
  - Leverage True Restoration across layers
- Anomaly detection
- Failure Prediction / Restoration
  - Why wait for a failure? anticipate it!
  - Predict Restore path $P_{ch\_RESTORE}$ and $P_{ch\_existing}$
  - Leverage Controllers to push settings
- Learn the real network
  - OTDR and ONM raw data interpretation
- AI to reconfigure the network
  - Q: Are we ready for all of this?



What is Cisco doing?

- Automatic OTDR events recognition
  - Recognize / interpret OTDR event root cause based on OTDR events graphs
  - Shipping with NCS 1010 solution!
- Proactive approach for failure detection in RON Networks
  - Real-time pre-failure warning
  - Early detection of failure links
  - Preventive rerouting
- DWDM grid channel anomaly detection based on OCM
  - Recognize from OCM spectral images any Channel facing issues not detectable with classical techniques

Performance optimized 1.2T Wavelengths



Cisco NCS 1014 – High-Performance Shelf

- Latest Gen Chassis, Fans, and PSUs to support up to 600W per slot
  - Precision Timing support
  - East-West Line Cards backplane interconnect
  - Redundant & Field replaceable Solid State Drive (SSD)
  - Headless operation

- Compact modular with 4 Line Card slots
  - 2RU, 600mm rack compliant
  - Field replaceable Controller card, 2+1 Fans and 1+1 AC/DC Power Supplies
  - Can be deployed in 19-, 21- and 23-inch racks
- IOS-XR software with focus on complete life-cycle automation

NCS 1014 – 2.4T Line Card Details

- Key Line Card Capabilities
  - Same Line Card for C-band and L-Band (Dedicated CIM 8 pluggables)
  - Single and Dual Card operating mode
  - PRBS on Client and Line interfaces
  - PTP & Encryption support
- 100GE QSFP28, 400GE QSFP-DD, 800GE QSFP-DD800 Clients
- **Pluggable Trunk module (CIM 8)** @ 1.2Tbps 140+GBaud
  - From 400G to 1200G in 100G increments per Carrier
  - 2nd Gen 3D Shaping using 5nm Jannu DSP
  - 90%+ of LH Routes supported at 800G w/o regeneration
  - 65% lower power than competitive solutions

First Pluggable to Break into the Terabit Era

Coherent Interconnect Module 8 (CIM 8)

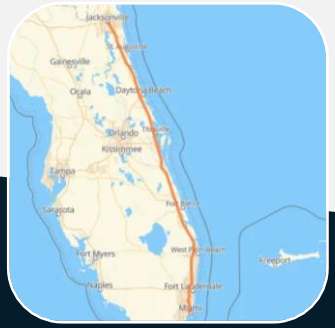
- Pluggable, Single Carrier, High-Capacity Multi-Haul Transceiver
  - 1200G for DCI ZR (120km)
  - High performances 800G for Metro/Regional or 400G for LH and Subsea
  - Any Channel Plan - Continuously variable Baud Rate up to 140Gbaud
  - Any Distance - Continuously variable Spectral Efficiency
- Full C-band and L-band tunability
- Power & Performances Optimized thanks to Acacia 5nm Jannu DSP
  - 2dB improvement of OSNR sensitivity
  - >15Mrad/s SOP tracking speed
- Co-packaging of DSP and SiPh optics (OE-MCM – like 400ZR)
  - Size, Power, Reliability and Performances advantages

Multi-Haul Optimized Solution: Metro to Subsea

verizon

Commercial fiber network with 1Tbps across 14x spans

windstream wholesale



1 Tbps wavelength over a 1,100 km link across Windstream's Intelligent Converged Optical Network

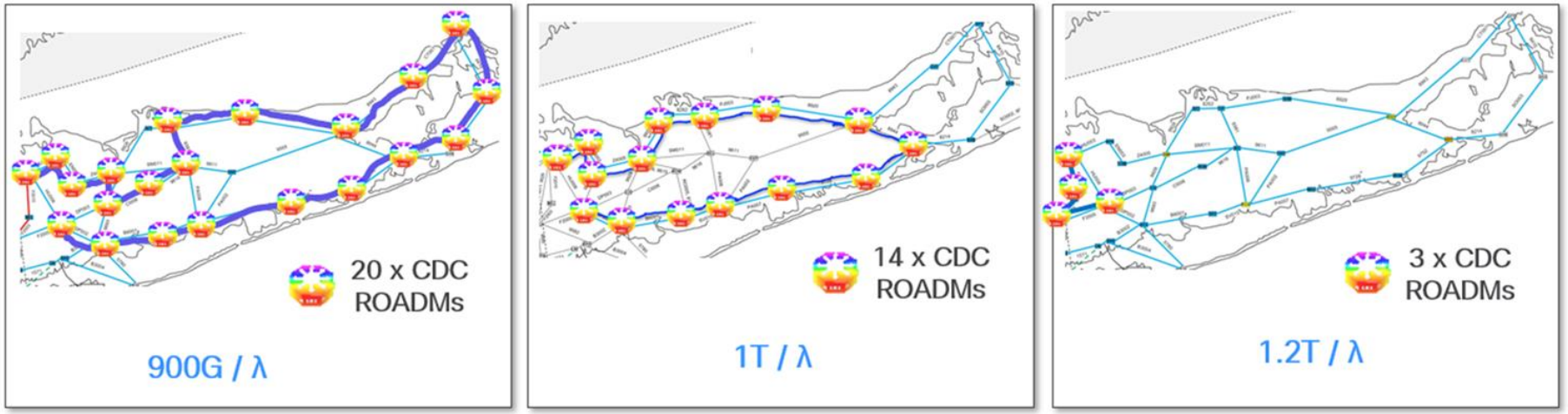
Microsoft

800Gbps on the Amitié transatlantic communications cable

aarnet

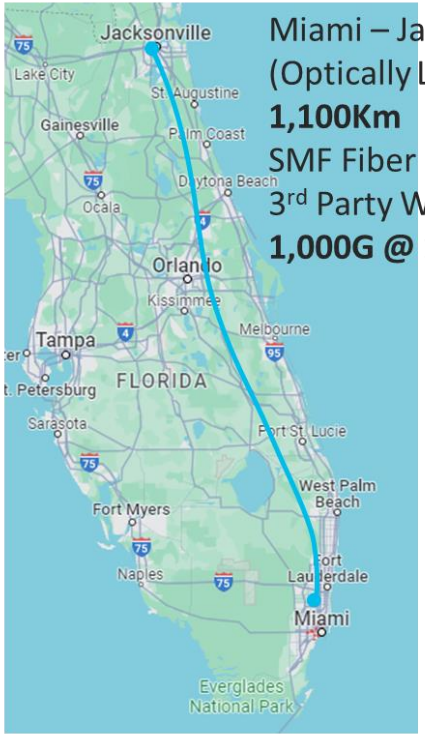
Longest distance 400 Gbps transmission trial on the Indigo subsea cable system; 18,400 km from Sydney to Singapore

NCS 1014 over ROADM-rich Networks



- NCS 1014 over NCS 2000 FS-SMR Live Network, with 100G & 200G wavelengths
- CIM 8 operated @ 138GBaud & Different Wavelength Capacity
- More details in Verizon Press Release

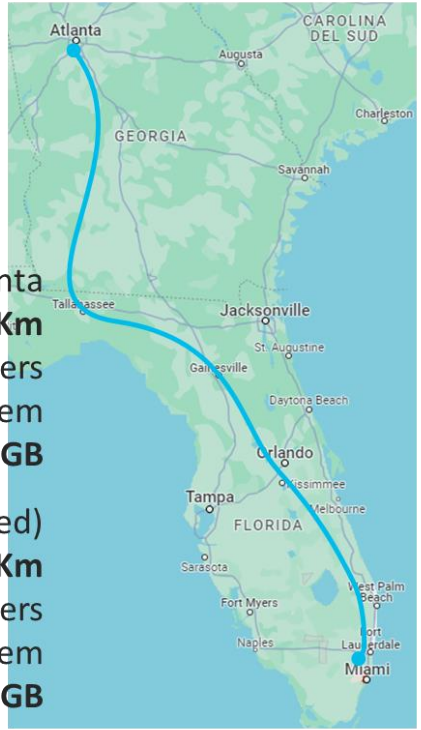
2.4T WDM Line Card on LH Networks



Miami – Jacksonville
(Optically Looped)
1,100Km
SMF Fiber
3rd Party WDM System
1,000G @ 136GB

Miami – Atlanta
1,387Km
SMF & TW Fibers
3rd Party WDM System
800G @ 136GB

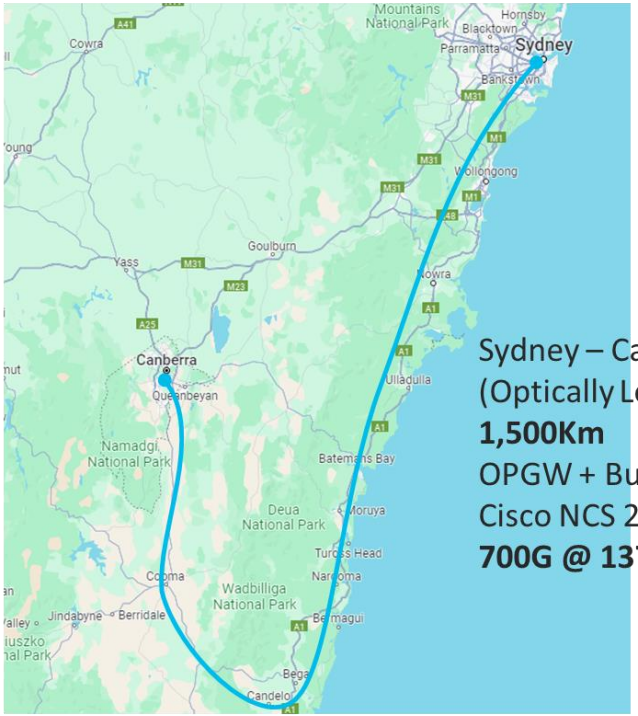
(Optically Looped)
2,774Km
SMF & TW Fibers
3rd Party WDM System
600G @ 136GB



"We developed ICON to provide multi-vendor flexibility and seamlessly integrate the newest optimized technology into our disaggregated network. Achievements like this reinforce our 800G wave strategy and offer improved design and network planning options among our 100G and 400G solutions."
John Nishimoto, Windstream Wholesale SVP of products, marketing, and strategy

Full Press Release

2.4T WDM Line Card on LH Networks



Sydney – Canberra
(Optically Looped)
1,500Km
OPGW + Buried Fiber
Cisco NCS 2000 WDM System
700G @ 137GB

Canberra – Goulburn
(Optically Looped)
300Km
Buried Fiber
Cisco NCS 2000 WDM System
1,100G @ 136GB

Canberra – Sydney
400Km
Buried Fiber
Cisco NCS 2000 WDM System
1,000G @ 136GB

2.4T WDM Line Card on Submarine Network

Amitie Trans-Atlantic Submarine Cable

6,234Km (Boston to Bordeaux)

16-fiber SDM Cable

800G @ 138GB (5.33bit/s/Hz) / 700G @ 115GB (5.6bit/s/Hz)

600G @ 138GB (Loopback setup on 12,469Km)

"This field trial demonstrates what is now a commercial technology for subsea routes, and we can improve the network capacity to help drive digital transformation for people, organizations, and industries around the world."

Jamie Gaudette, GM of Cloud Network Engineering, Microsoft

Full Press Release

2.4T WDM Line Card on Submarine Network

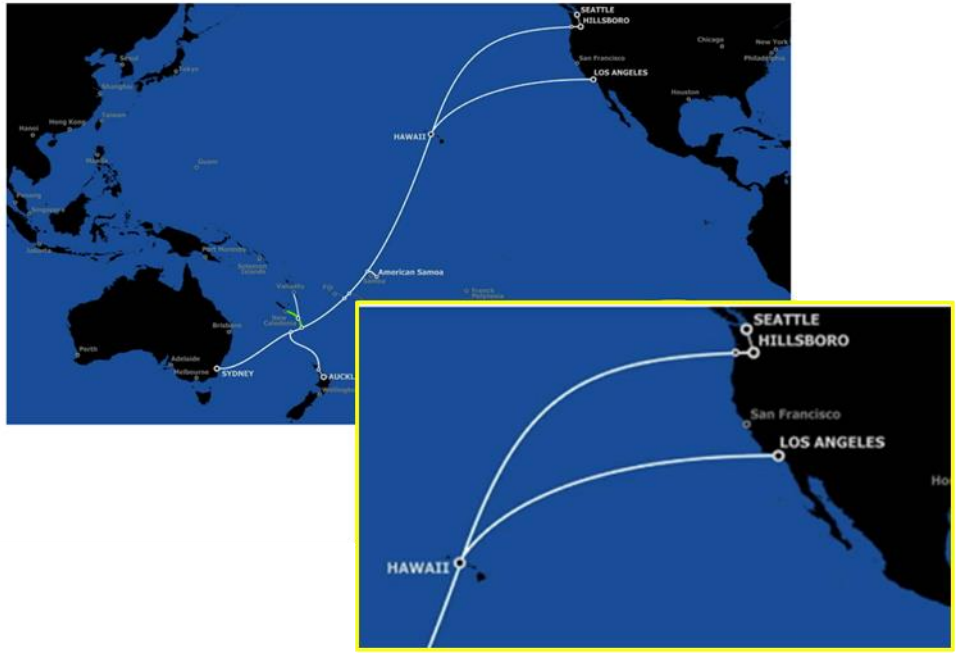
Indigo Submarine Cable

2-fiber Spectrum-sharing Cable
(Designed to support 36Tbps)

4,600Km (Indigo West – Singapore to Perth)
4,600Km (Indigo Central – Perth to Sydney)

800G @ 138GB
(4,600Km on Central)
600G @ 136GB
(9,200Km on Central looped)
400G @ 119GB
(18,400Km on Central+West looped)

2.4T WDM Line Card on Submarine Network



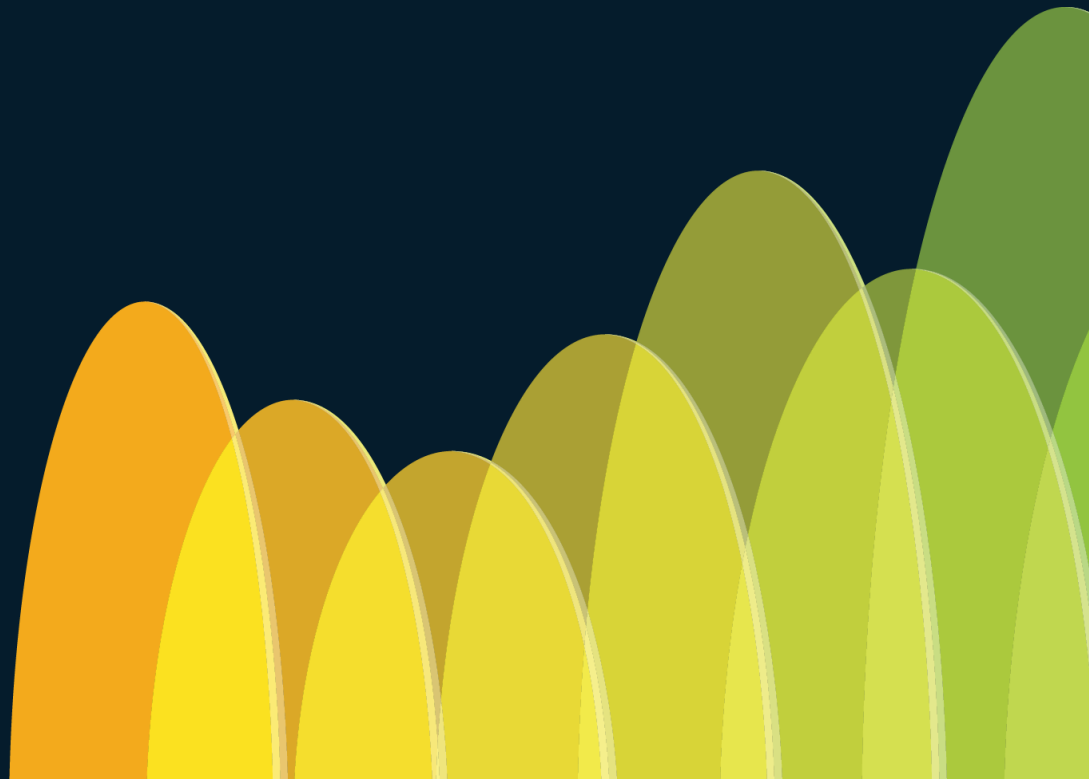
[Hawaiki Submarine Cable]

spans 15,000 km, linking Australia, New Zealand, American Samoa, New Caledonia, Tonga and other Pacific Islands, Hawaii and Oregon, on the U.S. West Coast

4,522Km (Kapolei, HI – Hillsboro, OR)

600G @ 128GB
(0.5dB Q-Margin in the worst portion of the spectrum, including 30dB terrestrial link, w/o OEO regeneration)

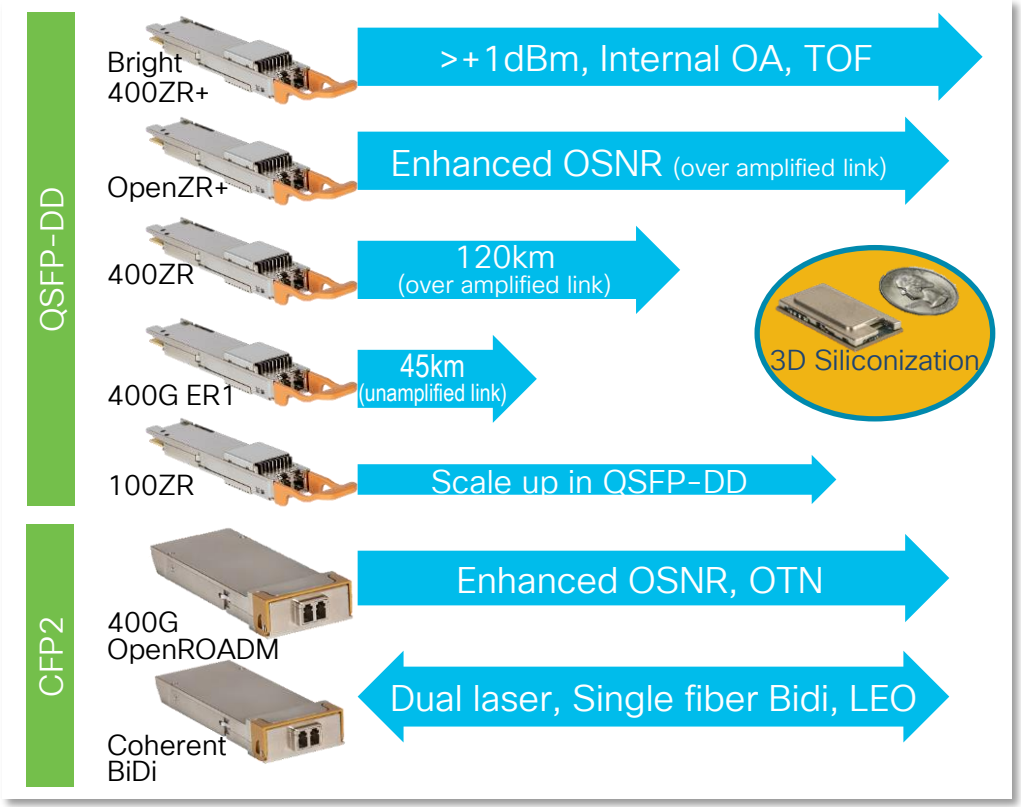
Coherent DCO Evolution toward 1.6T Wavelengths



cisco Live!

Cisco/Acacia – The Broadest 400G MSA DCOs Portfolio

- Addressing wide range of hyperscale & service provider applications
- Anchored by industry standards – many driven by Acacia
- Leading 400G pluggable deployments (**250,000+ ports** shipped)
- 10,000+ Bright 400ZR+ units shipped
  - 25M+ service hrs w/ no field failures



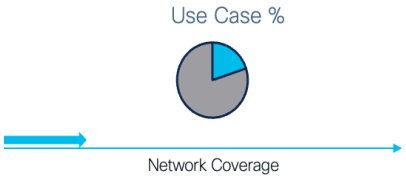
400G QDD Digital Coherent Optics Portfolio

ER1

Point to Point
Intra-data center, campus interconnect, core-to-edge router

Lowest Cost
Based on fixed laser with simple point-to-point connectivity

Short Reach
Up to 45KM for unamplified at 13dB

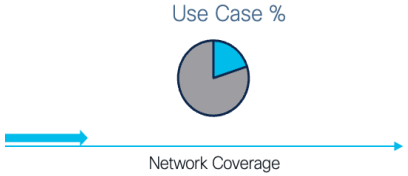


ZR

Point to Point
Web, Data Center Interconnect, Non-SP/SP router interconnect

Low Cost
Lowest cost 400G DCO option for very simple designs

Short Reach
Up to 120KM for P2P amplified links

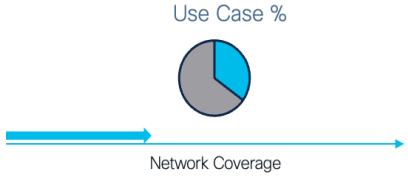


ZR+

Data Centric
Web Scale, DC Interconnect, Non-SP/SP Router Interconnect

Cost Optimized
Essential power and features only to optimize for cost

Simple Features
Designed for open line systems that balance power levels; high-performance forward error correction

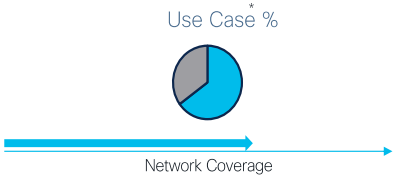


Bright ZR+

Transport Centric
Service Providers, Routed Optical Networking

High TX Power
+1dbm for difficult spans; interop with brownfield transponder & legacy line systems

Advanced Features
TOF, OTN and L1 Encryption features; integrated optical amplifier

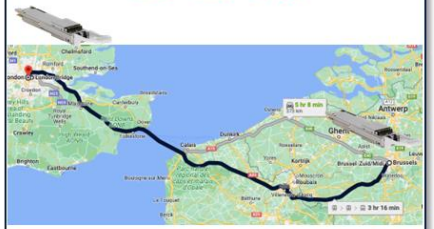


400G DCO Can Go the Distance

SP in Norway

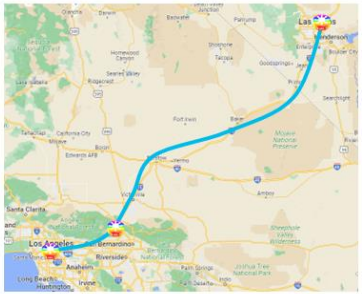
- Bright 400ZR+
- Alien λ over 3rd party line system
  - CDC ROADM, EDFA only
- >2.5dB margin
- Plug and play!

colt



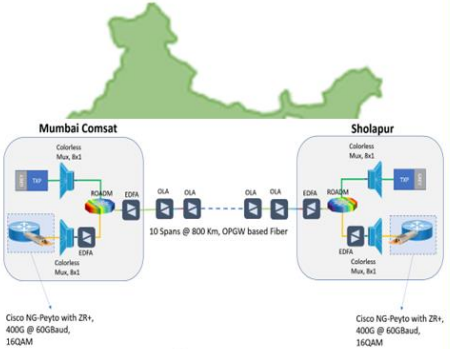
- Bright 400ZR+
- Across the English Channel with challenging high loss span
- Trial 1 at 430km; Trial 2 at 640km
- >2.5dB margin

Tier 1 US Cable operator



- Bright 400ZR+ with 8201
- 520km high loss E-LEAF fiber, span > 26.5dB
- Two different OLS vendors
- Error free with margin

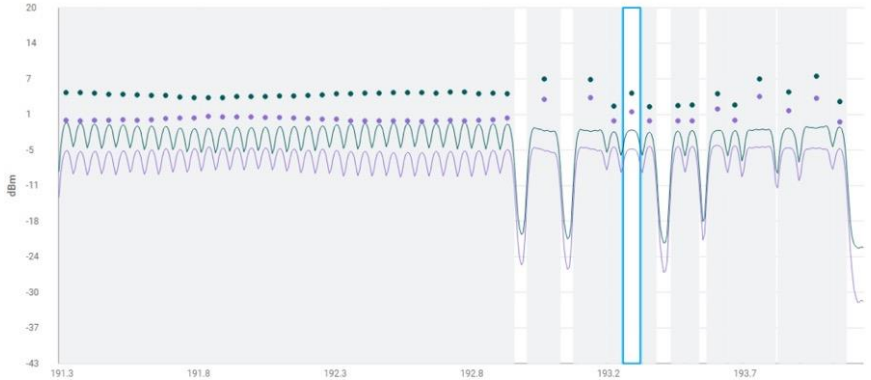
Tier 1 SP in India



- 400ZR+ with Cisco routers
- >800km longest route
- Core network over 3rd party ROADM OLS

Sipartech – 400GE over 1,337km with Bright ZR+

- Mixed SMF28 and E-LEAF fiber with 8 ROADM sites
- Alien λ over 3rd party CDC ROADM line system, plug and play!

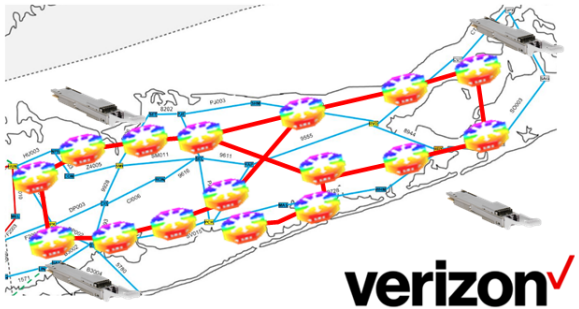


"With the interoperability of Cisco's equipment, we can deploy our next generation 400G+ services with speed, simplicity, and flexibility to meet our customers' needs, while optimizing energy expenditure and our carbon footprint as part of our global strategy."
Julien Santina, Sipartech CEO

Expanding 400G DCOs to ROADM-rich Networks

Verizon Metro

20 x CDC ROADMs

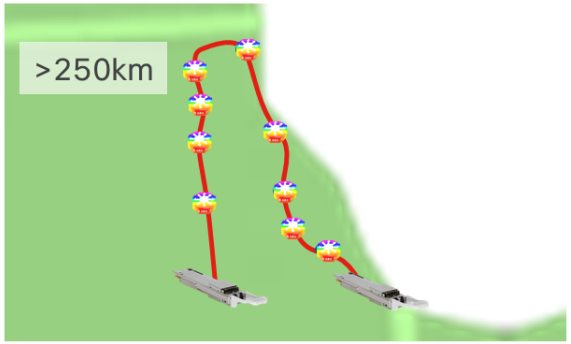


verizon

- Bright 400ZR+ QSFP-DD
- 16 NCS 2000 ROADM nodes w/ CCOFS
- Dense Metro ROADM network
- POC conducted directly in Viavi tester

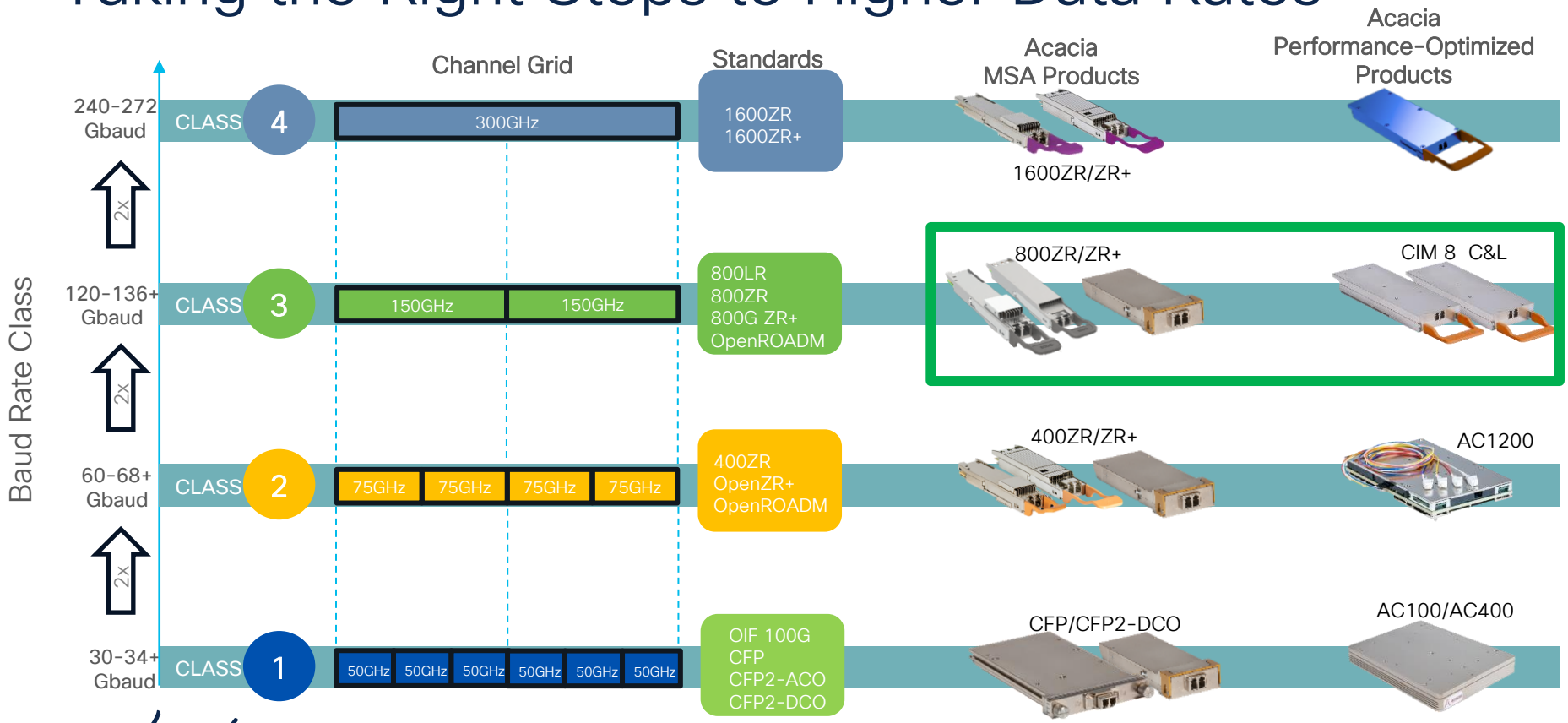
North American T1 Cable Operator

9 x CDC ROADMs



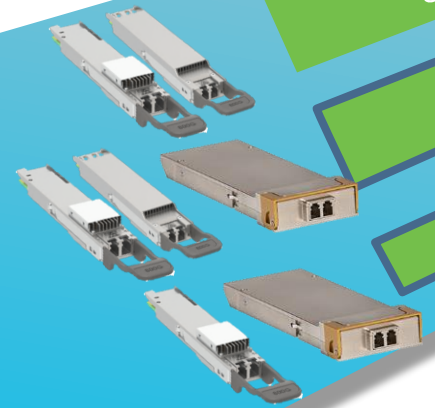
- Bright 400ZR+ QSFP-DD + 8201
- Alien λ over 3rd party CDC ROADM line system
- 75GHz ROADM pass band
- Plug & play with deployment margin

Taking the Right Steps to Higher Data Rates



Welcome to the 800G Pluggable Generation!

- Leveraging proven & **deployed** 140Gbaud CIM 8 SiPh & 400ZR+ Bright
- Expansion of 120-140Gbaud Acacia products
- 1st to support interop PCS 800G ZR+ **and** OIF 800ZR modes
- Supports CMIS 5.3
- C&L Band



800ZR

800G ZR+ (Interop PCS, +1dBm)

400G Ultra Long Haul

Silicon Based

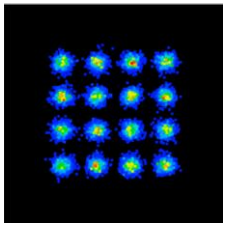
Acacia Delphi 800G LR/ER/ZR/ZR+

OIF

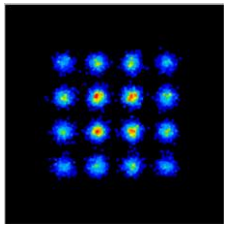
OpenROADM

OpenZR+ MULTI-SOURCE AGREEMENT

Validation of production PIC, Driver and TIA in OE-MCM with Jannu DSP



118Gbaud 16QAM

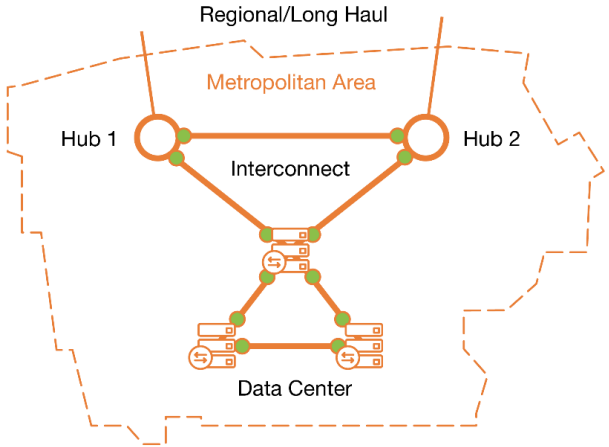


131Gbaud Interop PCS

Delphi DSP Enables NG Speed & Distance Migration

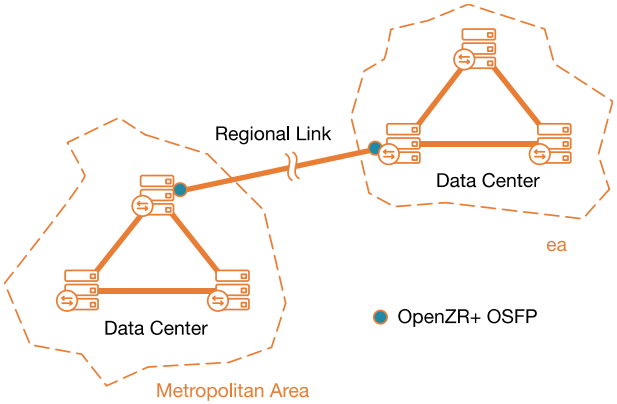
400ZR to 800ZR

- Migrate P2P DCI/Metro architecture to 800G



400G ZR+ to 800G ZR+

- Migrate regional links to 800G



400G Ultra Long Haul

- Adds ULH capability to 400G pluggables portfolio

400G ULH MSA Pluggable Coherent Modules

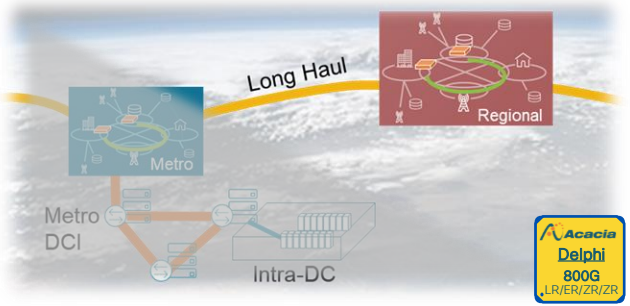
Use in existing platforms 400G slots – same electrical interface and max power

- <24W – backwards compatible w/ Greylock 400G
- 56G PAM4 x8 Serdes
- ZR framing, FlexO streaming
- Built-in OA and TOF
- C-Band >1dBm Tx output
- L-Band coming

OpenROADM

OIF 800ZR

OpenZR+ MULTI-SOURCE AGREEMENT



Client interface

Client Protocol Support:

- 100GbE: 100GAUI-2
- 200GbE: 200GAUI-4
- 400GbE: 400GAUI-8

- OTN: FOIC-1.2

QSFP-DD Type 2A

CFP2

Line interface

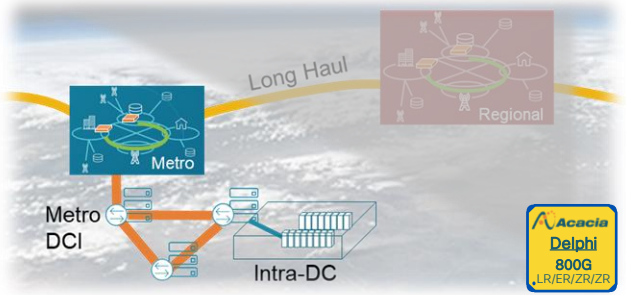
Optical Transmission (C-band Tunable)

- 400G QPSK
- 400G PCS
  - 96 GBaud for 112.5GHz spacing
  - 79 GBaud for 100GHz spacing
  - 65 GBaud for 75GHz spacing
- OpenZR+ (60 Gbaud): 400G, 200G, 100G

800G ZR/ZR+ MSA Pluggable Coherent Modules

- 120+Gbaud Class 3
- Serdes: 112G PAM4 x8
- 800ZR and FlexO-xe origination, FlexO streaming
- Built-in OA and TOF
- C-Band >1dBm Tx output
- L-Band coming
- 800ZR <28W; 800G ZR+ <30W

OpenROADM
OIF 800ZR
OpenZR+ MULTI-SOURCE AGREEMENT



Client interface

Client Protocol Support

- 100GbE: 100GAUI-1/2
- 200GbE: 200GAUI-2/4
- 400GbE: 400GAUI-4/8
- 800GbE: 800GAUI-8
- OTN: FOIC-1.1/2 (CFP2)

Line interface

Optical Transmission

- C-band Tunable
  - OIF 800ZR
  - 800G Interop PCS (131 Gbaud)
  - 600G Interop PCS (118/131 GBaud)
  - 400G ULH QPSK & PCS (65/79/95 Gbaud)

400G ULH & 800G ZR+ Field Trials

Stockholm, December 17, 2024 – Arelion today announced it has completed a live network field trial on its route from Chicago to Denver with Cisco 400G Ultra Long Haul (ULH) QSFP-DD Coherent pluggable optical modules using the Cisco 8000 series routers, powered by Cisco Silicon One. This trial demonstrated successful IP transmission at a spectrum of 112.5 gigahertz over 2,253 kilometers, with healthy margins, providing longer transmission distances and higher cost savings than currently deployed transponders. Cisco's 400G ULH pluggables enable Arelion to reduce CAPEX by 35 percent and OPEX costs by 84 percent when expanding its network, providing wider reach with high capacities that support customers' AI/ML and cloud applications.

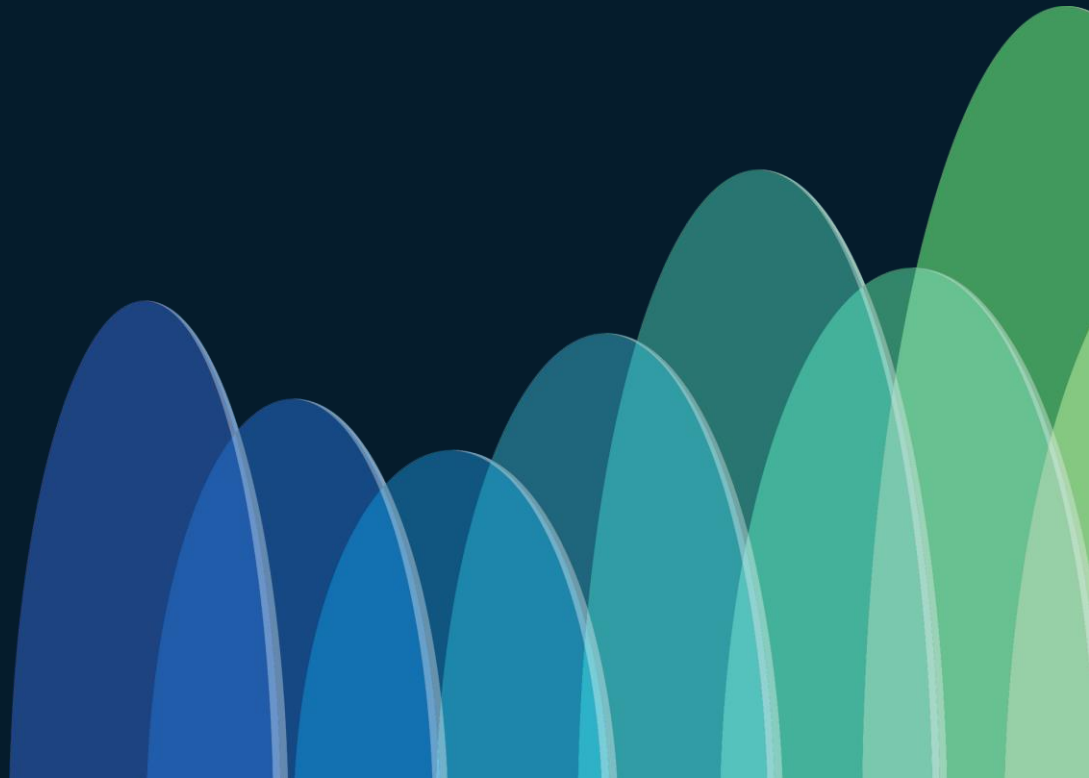
Colt Showcases Cisco 800G ZR+ Coherent Optics in AS8220 Network

Colt Technology Services January 14, 2025

Colt Technology Services, the digital infrastructure company, today announced that it is first to successfully trial Cisco's 800G ZR+ coherent pluggable optics[1] in its production AS8220 network using the Cisco 8000 series routers, powered by Cisco Silicon One. The Routed Optical Networking testing– carried out across the 667km between Frankfurt and Munich, Germany– is the latest in a series of Colt trials with high-profile global partners designed to rethink technology's previous limitations as businesses require efficient, low latency, future-ready networking technology for AI, machine learning, API integration and other digital applications.

The trial showcased how the high-performance, energy-efficient networking technology can support businesses on their net zero journey. It demonstrated that the network can handle incredibly high data rates of 800Gbps – transferring 1 Terabyte of data in just eleven seconds – and can be flexible in allocating bandwidth where it's needed most, significantly improving overall efficiency and performance. The trial demonstrates that Cisco's 800G ZR+ coherent optics can double Colt's packet core capacity per link (800G) while reducing power consumption by 33.3%[2].

Sustainable Technology Innovation



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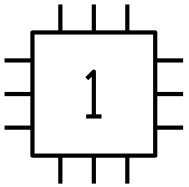
Changing the Economics of Building Networks

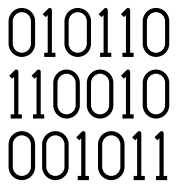
Optics

Increasing optics speed at a cost-efficient price point and a small footprint: silicon photonics + CMOS



Silicon

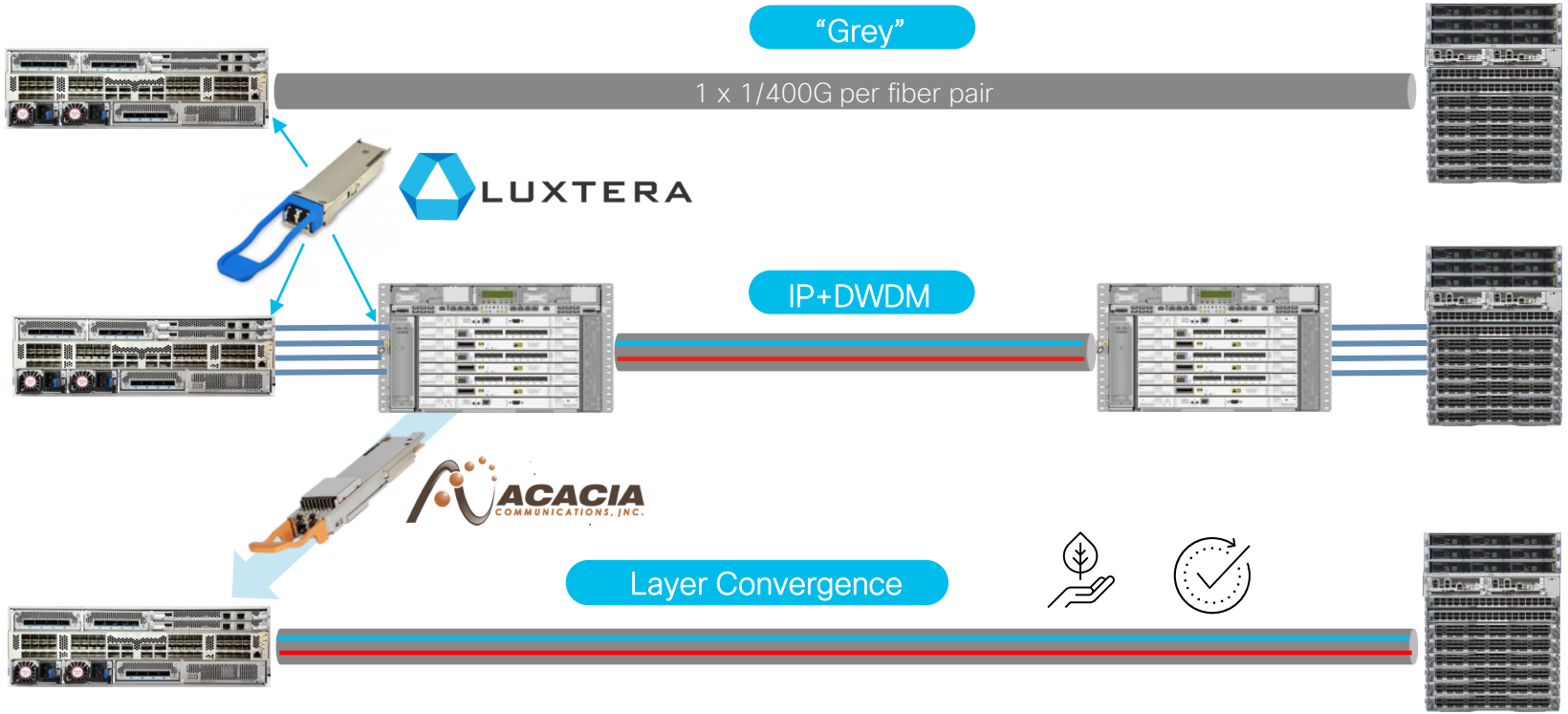
Silicon chipsets that are industry-leading in performance with no compromise on features enabling 12-18m Innovation cycles



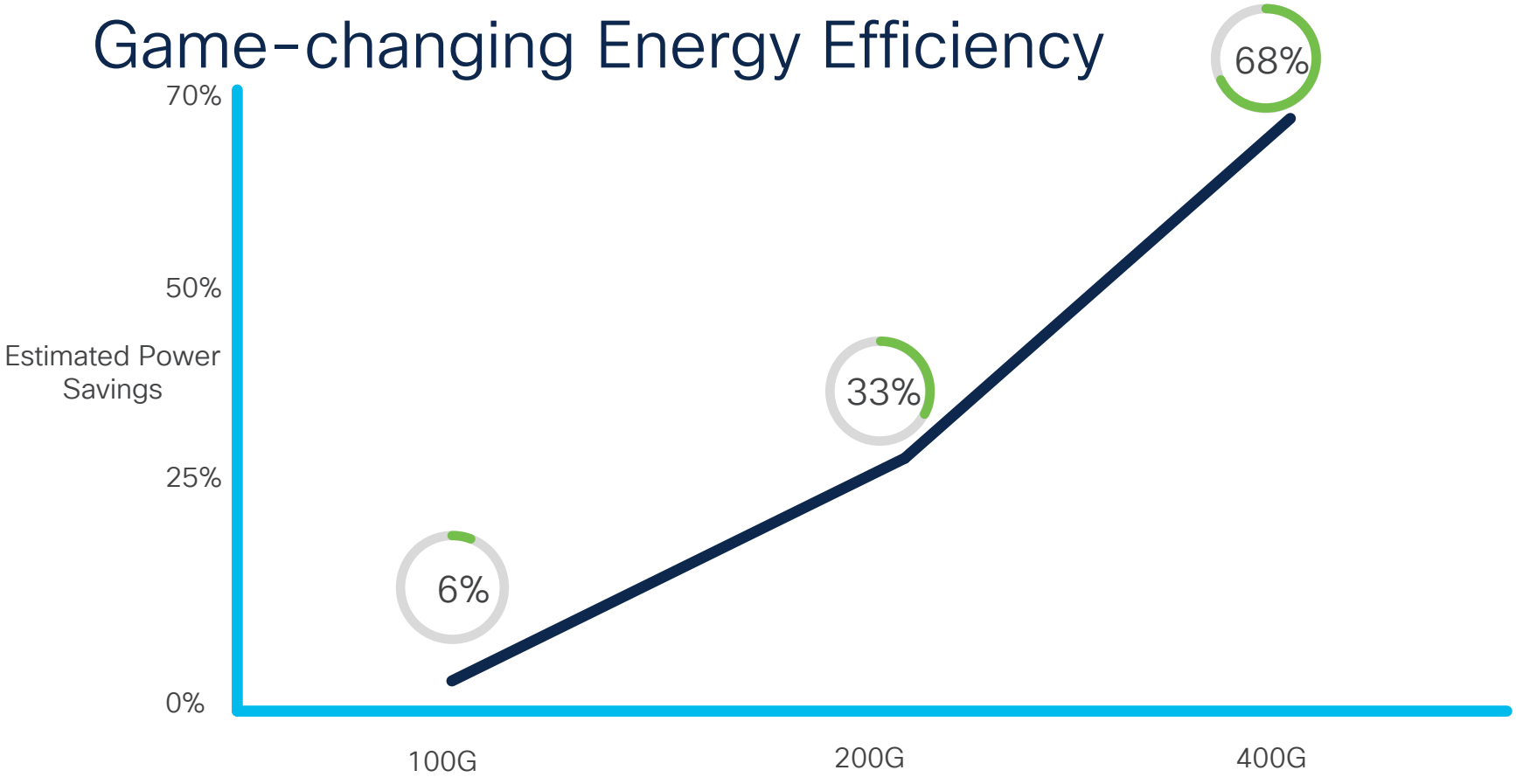
Software

Evolution of NOS and cloud enhanced applications to enable new architectures

Optics Investment, Fit-to-Architecture



Game-changing Energy Efficiency



Massive Energy Savings: How are they achieved?

Approximate Watt per G

Router

x2 Grey Optic

External Transponder

Separate Physical Layers

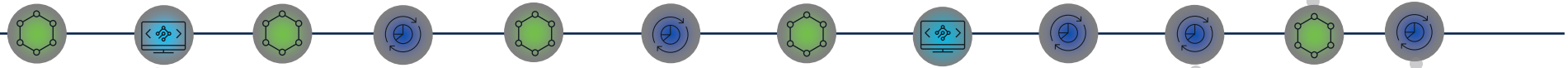
Router

DSP ZR+ Optic

Layer Convergence
"Routed Optical Networking"

Conclusion

Continued & Consistent Investments Boosting Innovation



2014 — LIGHTWIRE
Innovator in silicon photonics

2014 — tail-f
Network orchestration for multi-vendor networks

2016 — leaba semiconductor
Next Gen Silicon for Routing/Switching

2017 — APPDYNAMICS part of Cisco
Cloud application and business monitoring platform

High performance sustainable networks

2018 — LUXTERA FIBER TO THE CHIP
Automation of SiP manufacturing process

2020 — ThousandEyes part of Cisco
Deep visibility and insights into applications & services

Orchestration & Automation

2021 — ACACIA
Innovative high-speed coherent optics

2021 — sedona systems
Hierarchical SDN Controller (Optical and IP Networks)

Observability

2023 — ACCEDIAN
Network Performance Monitoring & Analytics

2023 — wgtwo
Cloud native mobile services platform

2023 — Sam Knows now part of CISCO
Broadband network monitoring with global internet health

2024 — splunk>
Security & Observability Platform

Key Take Aways

- Full set of Automation solution is available to address OLS Transport System Life Cycle
- State-of-the-Art >1Tbps per Lambda is ready for address any network requirement
- Digital Coherent Optics is set to disrupt the optical industry with a huge impact on green economy
- Knowledge is key to define the right engineering solution

Webex App

Questions?

Use the Webex app to chat with the speaker after the session

How

1. Find this session in the Cisco Events mobile app
2. Click “Join the Discussion”
3. Install the Webex app or go directly to the Webex space
4. Enter messages/questions in the Webex space

Webex spaces will be moderated by the speaker until February 28, 2025.

Fill Out Your Session Surveys

Participants who fill out a minimum of 4 session surveys and the overall event survey will get a unique Cisco Live t-shirt.

(from 11:30 on Thursday, while supplies last)

All surveys can be taken in the Cisco Events mobile app or by logging in to the Session Catalog and clicking the ‘Participant Dashboard’

Content Catalog

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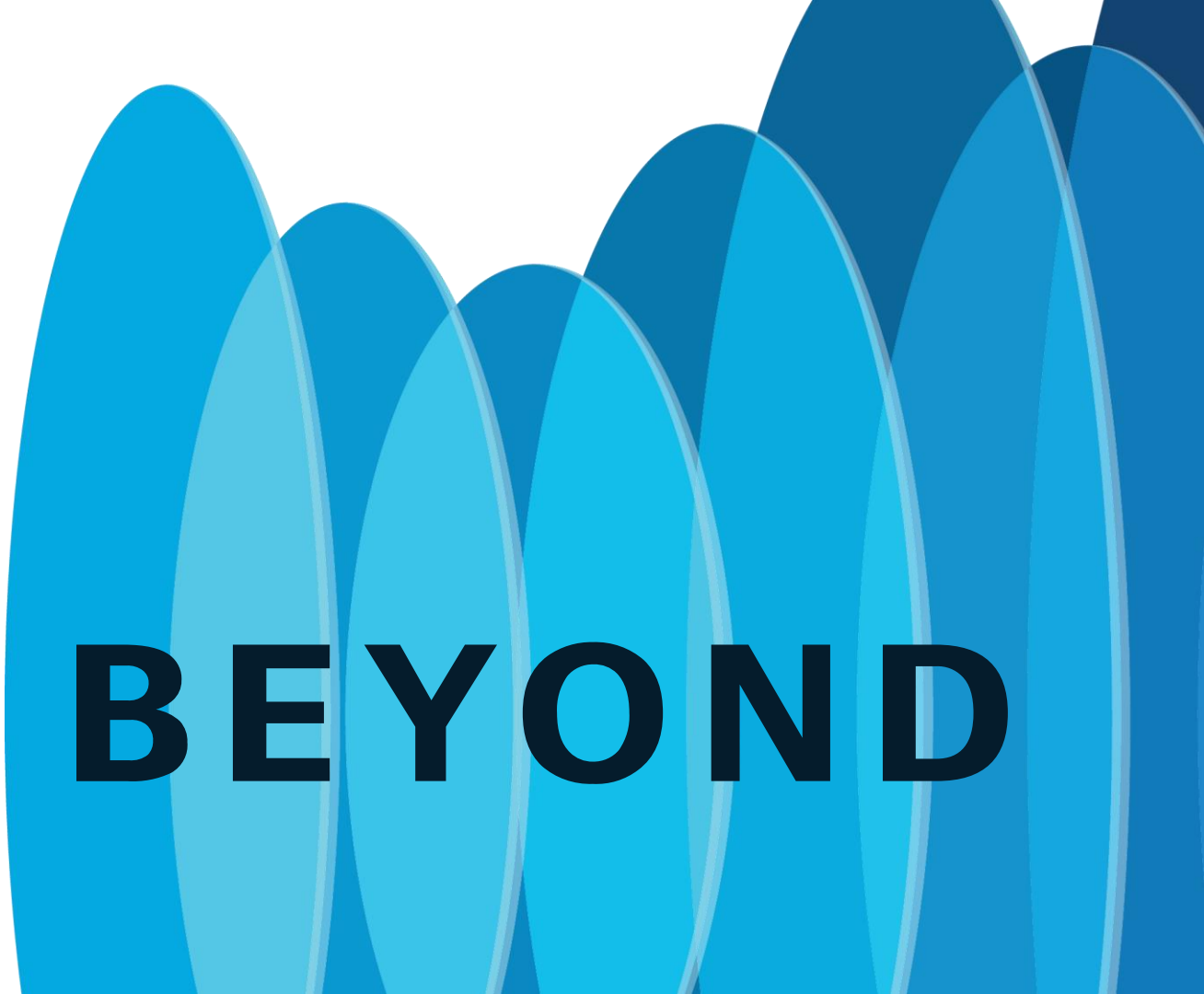
- Book your one-on-one Meet the Engineer meeting
- Attend the interactive education with DevNet, Capture the Flag, and Walk-in Labs
- Visit the On-Demand Library for more sessions at ciscolive.com/on-demand. Sessions from this event will be available from March 3.

Thank you

cisco Live!

cisco Live!



GO BEYOND