

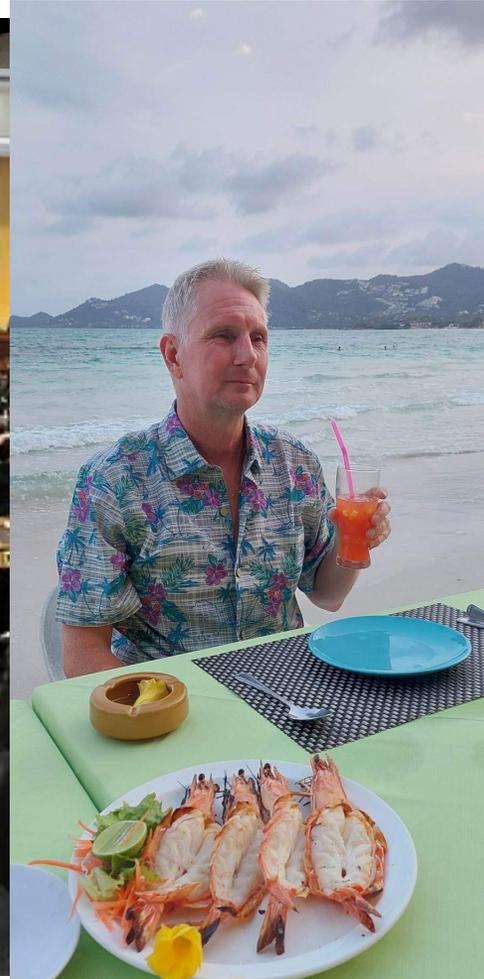
Latest news and trends from the optical industries

March 14, 2023

Kent Lidström

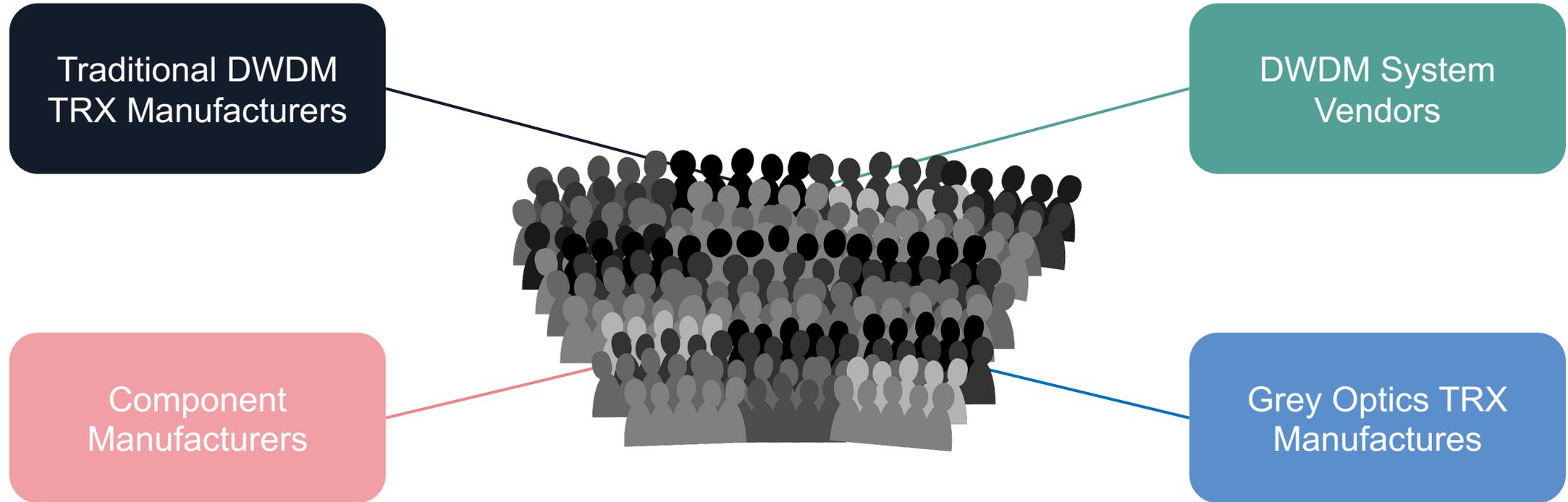
What is OFC?

Optical Fibre Communications Conference



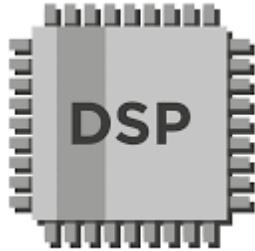
Coherent Optical Transceivers

OIF 400ZR & OpenZR+ is now a Crowded Space



Typical Building Blocks for OIF 400ZR & OpenZR+

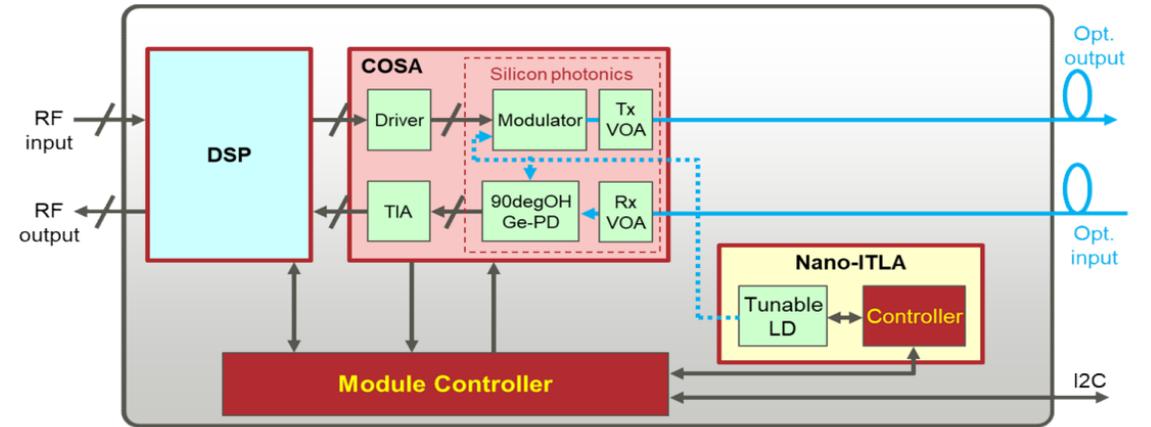
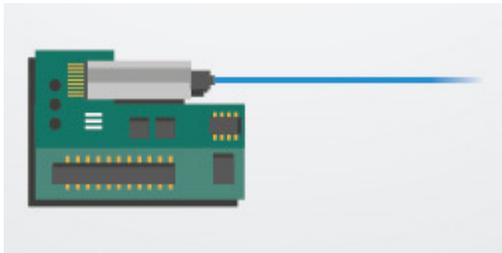
DSP



Silicon COSA



Nano-ITLA



Innovations around 400G Coherent Pluggable Optics

High Tx power 400G QSFP-DD

- In accordance with OpenZR+ but with 0 dBm output power
- Supported is already existing ROADM based networks
- Support for 200G 16QAM to work in 50GHz networks



Improved Optical Performance

- Probabilistic shaping
- Sub-carrier technology
- Additional modulation formats



OTN and Encryption support in 400G QSFP-DD

- OpenROADM compliant
- Layer-1 encryption
- In-band management via GCC



Flexible topologies

- MLG support
- Sub-carriers point-to-multipoint



Lower bitrates - 100G Coherent QSFP28

QSFP28 Transceiver

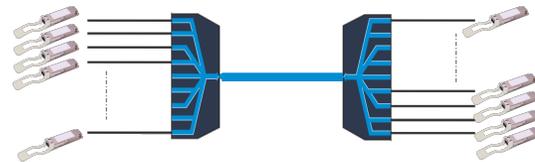


Features

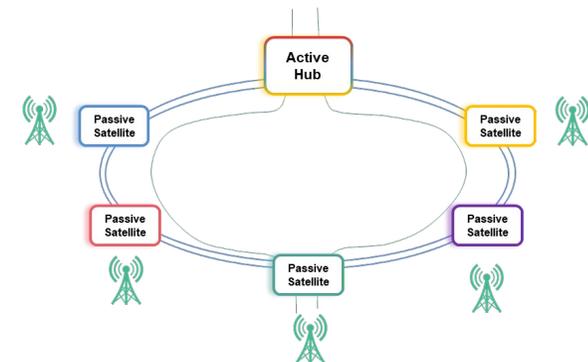
- Power budget: 22dB (Tx= -8dBm, Rx= -30dBm)
- Host interface: CAUI-4 or OTL4.4
- 100Gbps DP-DQPSK (25Gbaud)
- Full C-band tuneable
- Up to 80km unamplified, 120km amplified
- Optional extended reach up to 300km amplified
- SC-FEC or RS(255,239)
- Power dissipation <5.0W (C-temp) <5.5W (I-temp)

Applications

Point-to-point Networks



Access Networks



Target release: Q4 2023



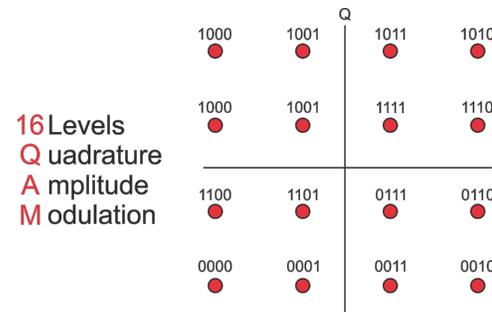
Higher bitrates - Coherent 800G

“interoperable 800G coherent line specifications for campus and DCI applications”.

Scope:

- Define single-lambda 800G coherent line interfaces for two applications:
 - Amplified, single span, DWDM links up to 80-120km
 - Unamplified, fixed wavelength links of 2-10km
- Support Ethernet client(s) (minimum 100GE) up to 800G aggregate bandwidth

Samples end 2023 General availability mid 2024.



Same modulation format as 400G, but with a higher baud rate.

Will require even wider channel passband than 400G.

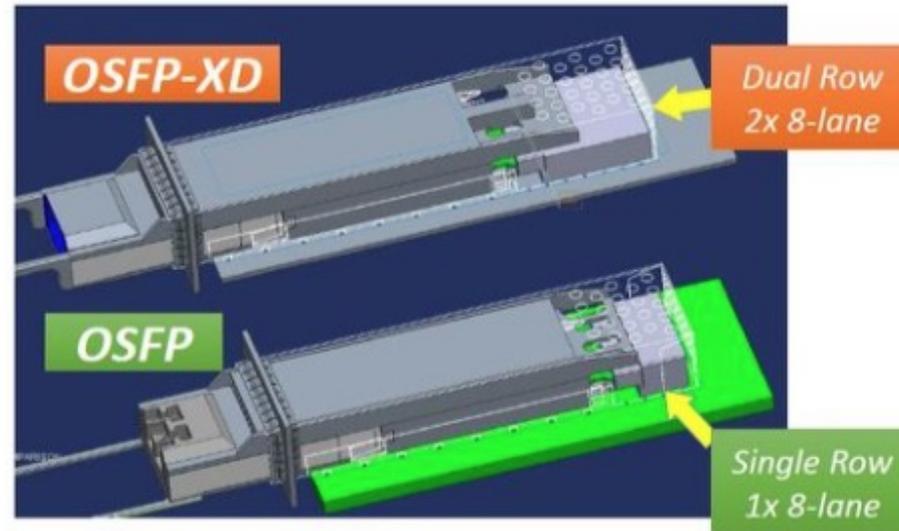


4x400GMSA



Even Higher bitrates - 1.6T

- The end of QSFP-DD?
- Proposed form-factor: OSFP-XD consisting of 16 electrical lanes
- 112G per lane, PAM4 encoded
- MSA groups are under development

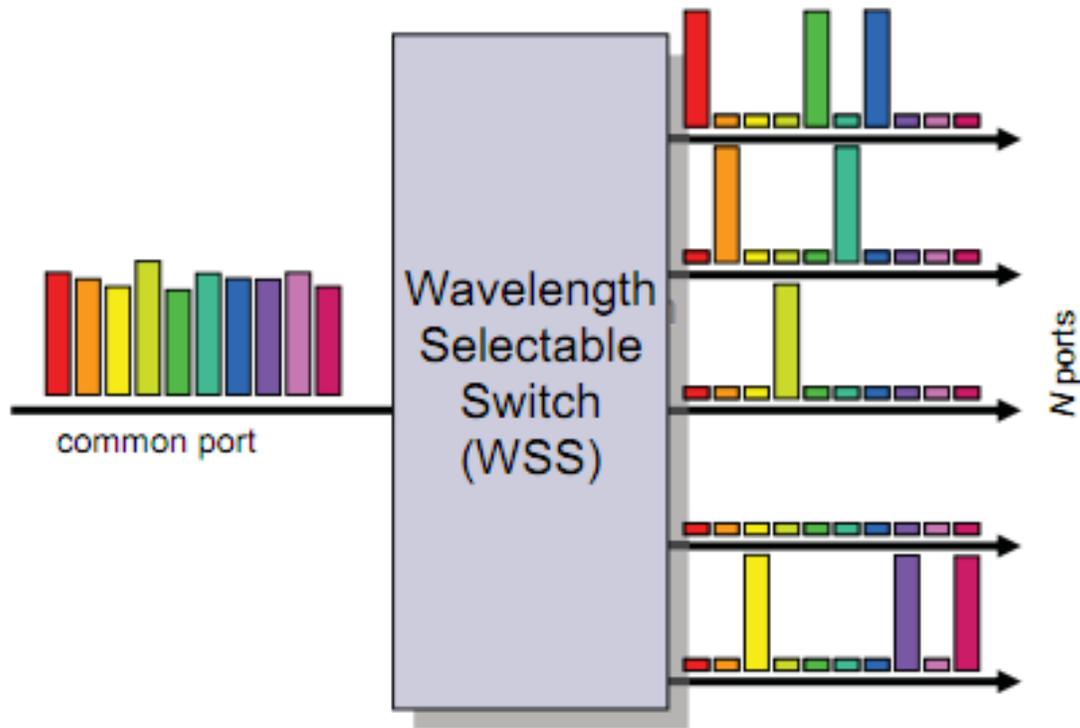




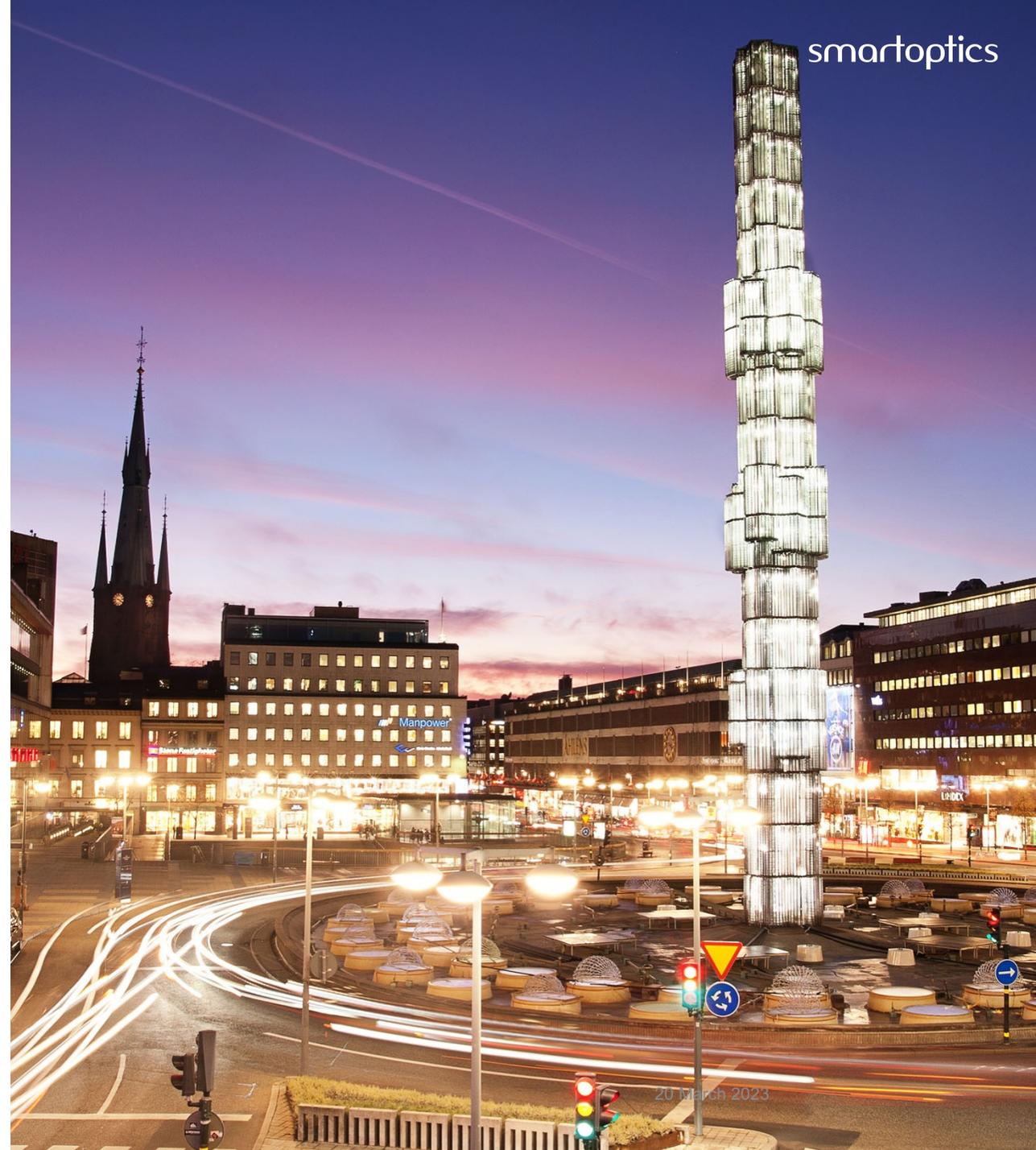
WSS Trends

What is a WSS?

WSS = Wavelength Selective Switch



The WSS is the key component in a ROADM module



Target Application – Any Type of Topology

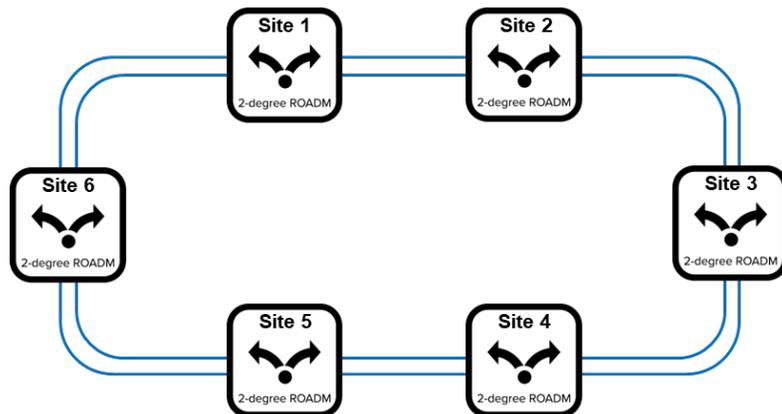
Point to Point



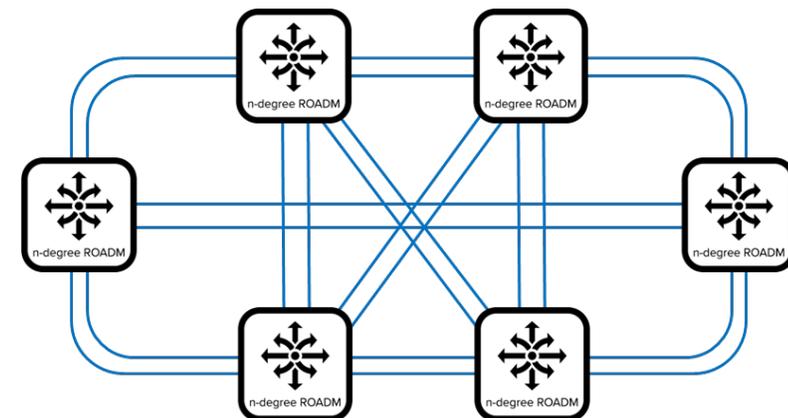
Chain



Ring



Mesh

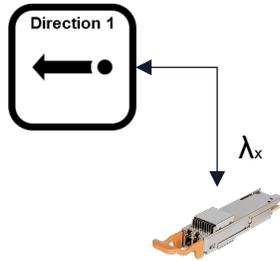


ROADM Configurations

CDC-F = Colorless Directionless Contentionless – FlexGrid

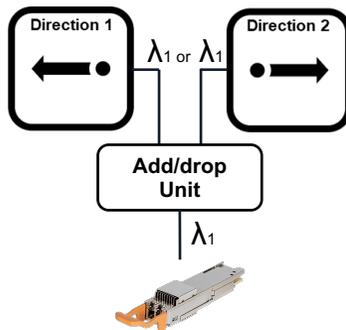
Colorless

A tunable laser can be connected to any port with any color



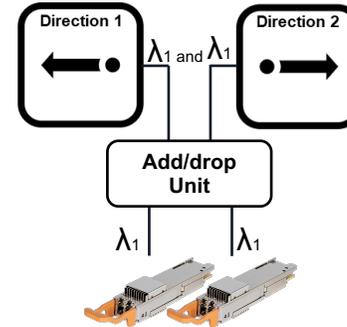
Directionless

A tunable laser can be connected to a port in an add/drop unit and optically routed in all ROADM directions



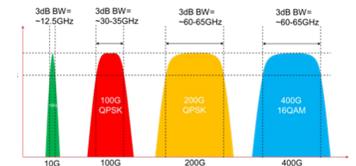
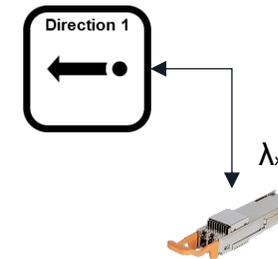
Contentionless

A tunable laser can be connected to a port in an add/drop unit with the same color that is already used and optically be routed in any unused direction



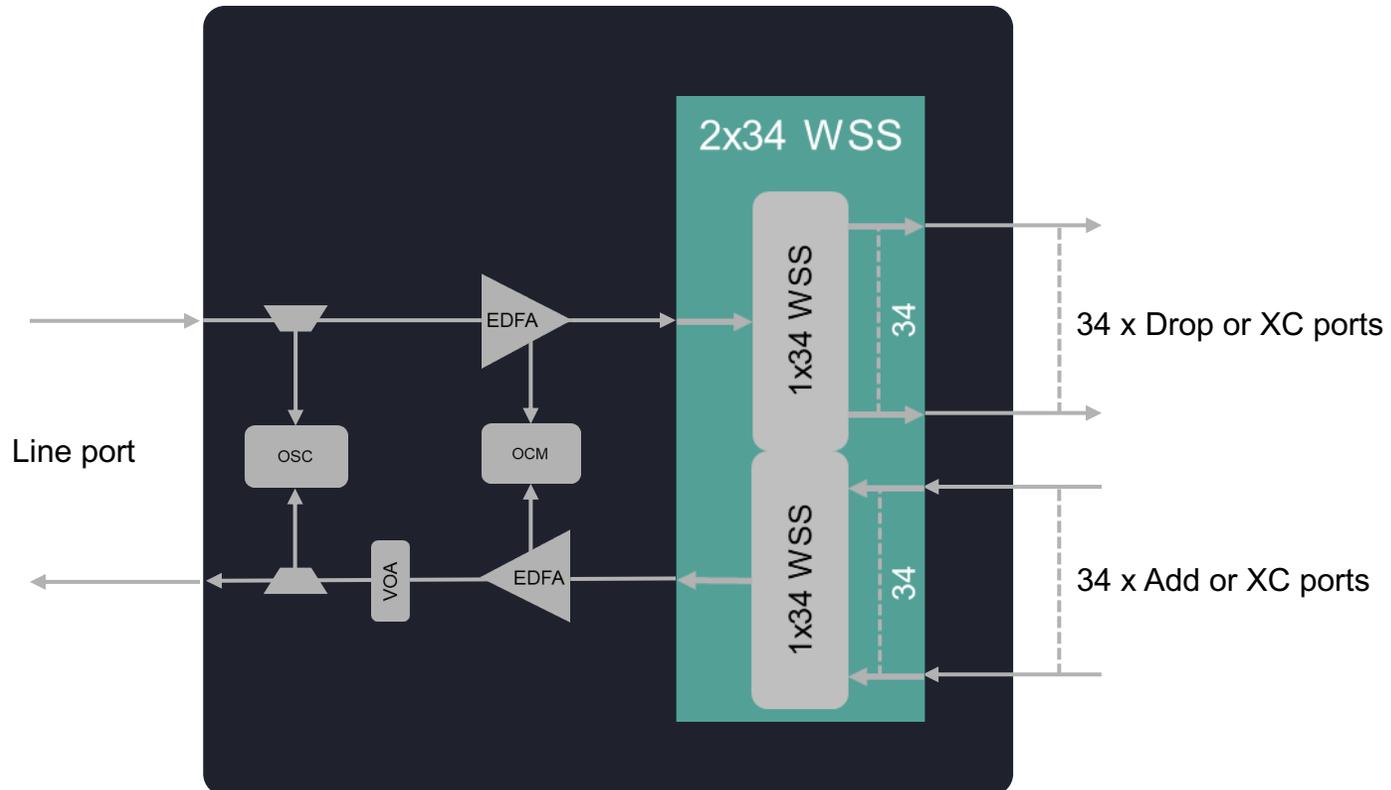
Flexgrid

A laser with any bandwidth or any wavelength can be connected to an add/drop port



WSS modules with more ports (degrees)

34-port twin modules are available today (2x34)

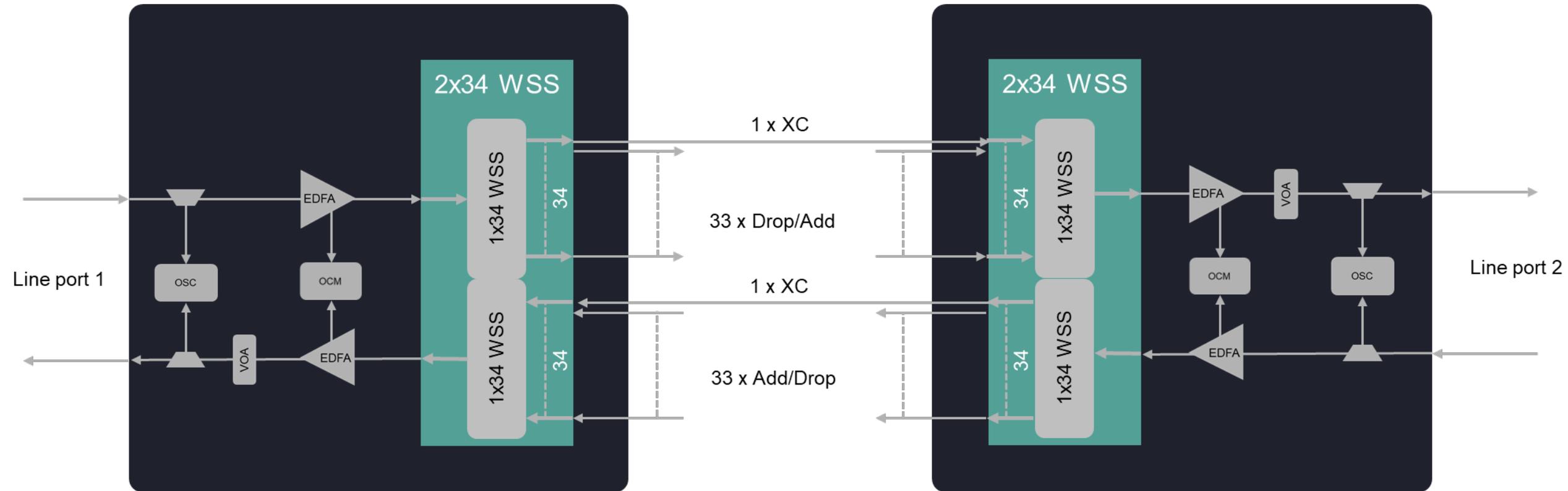


Advantages

- Allows usage of low TX power optics
- All ports are individual flex-grid ports
- Allows low-cost CDC-F add/drop structures

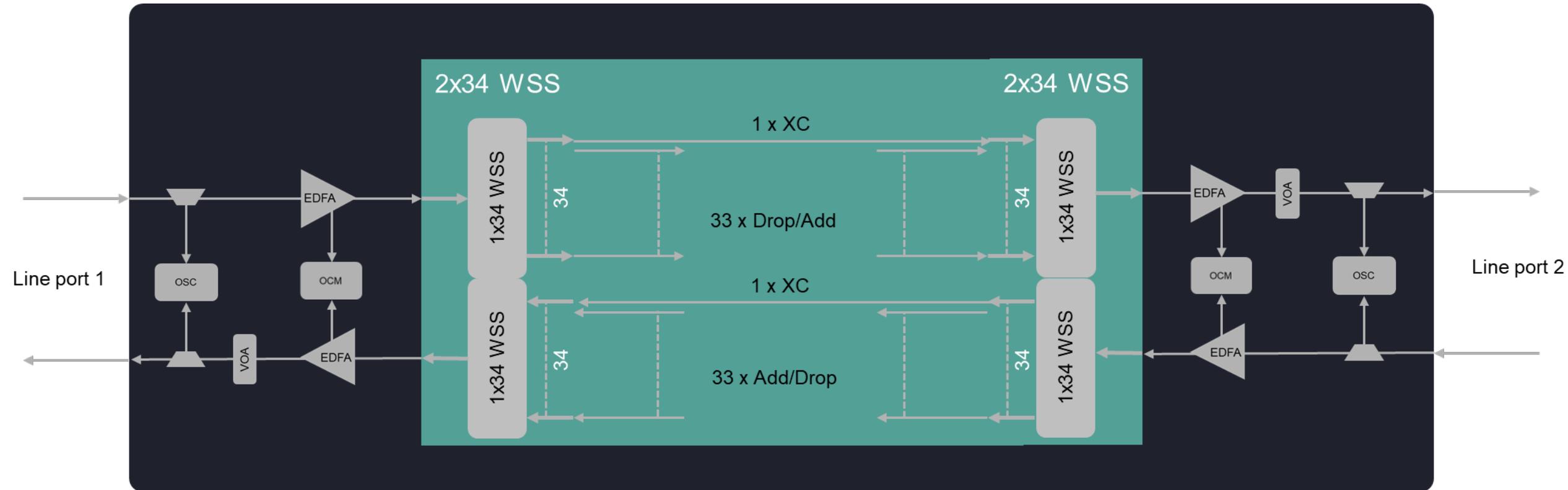
64 and 96 port modules will be available during 2024

2-Degree Connection using a twin WSS (2x34)



ROADM Trends – Introduction of Quad WSS modules

2-Degree connection using quad WSS (4x34)



Thank you