Defining 800ZR and 800LR; An OIF Update
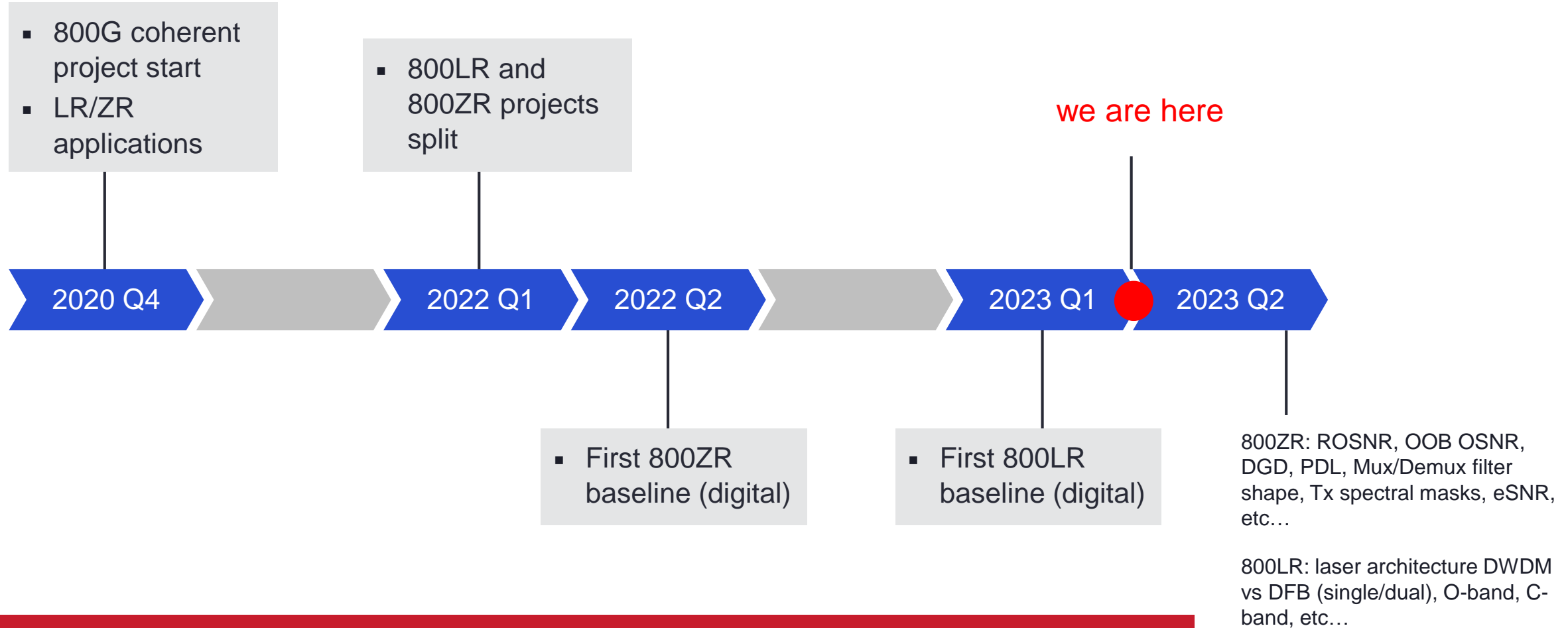
OFC 2023

Sebastien Gareau
Systems Architect

March 8th, 2023

OIF 800G Timeline
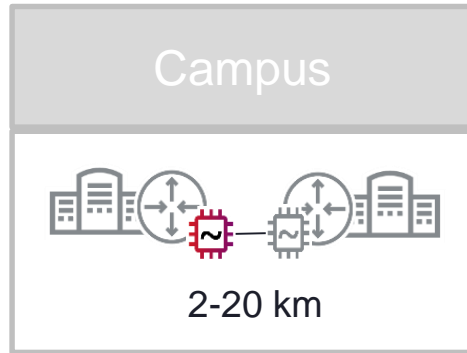
800G coherent project start
- LR/ZR applications

800LR and 800ZR projects split

we are here

| 2020 Q4 | | 2022 Q1 | 2022 Q2 | | 2023 Q1 | 2023 Q2 |

First 800ZR baseline (digital)

First 800LR baseline (digital)

800ZR: ROSNR, OOB OSNR, DGD, PDL, Mux/Demux filter shape, Tx spectral masks, eSNR, etc…

800LR: laser architecture DWDM vs DFB (single/dual), O-band, C-band, etc…

Baseline specs are enabling digital ASIC implementations

800ZR Applications
Addressing the DCI to the metro

400G today

Coherent
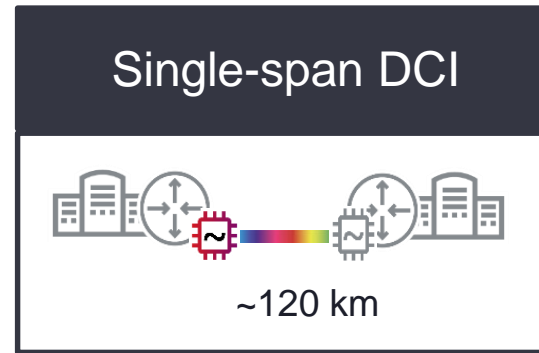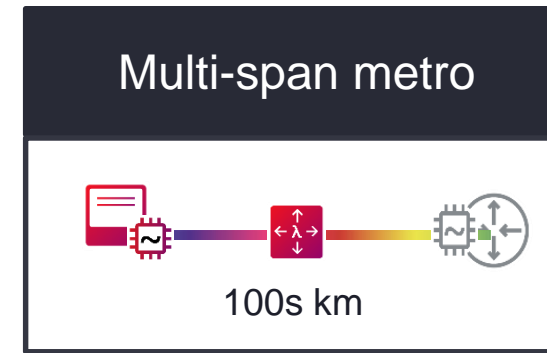400ZR — OIF
Unamplified plugs

Coherent
400ZR+/FlexO-4-DO
Amplified plugs

ciena WaveLogic™ 5 NANO

Campus	Single-span DCI	Multi-span metro
2-20 km	~120 km	100s km

800G

Coherent
OIF
800ZR/FlexO-8e-DO
Unamplified plugs? **Amplified plugs** **PCS**

ciena WaveLogic™ 6 NANO

Wide industry collaboration enabling common interoperable designs for multiple use cases

800LR Applications
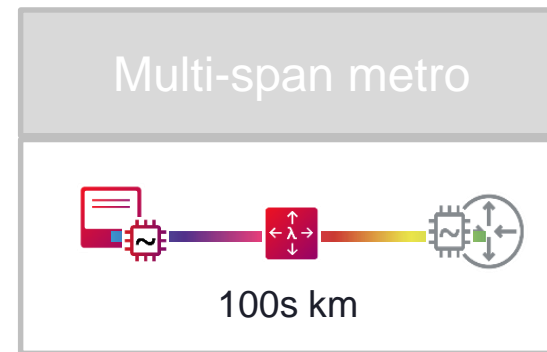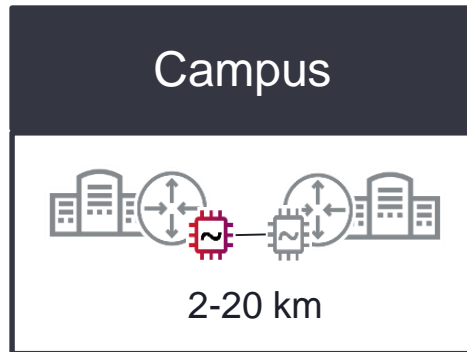## Addressing the expanding campus

400G today

IMDD
400GBASE-LR/ER

Coherent
400ZR — OIF
Unamplified plugs

Ciena WaveLogic™ 5 NANO

Campus	Single-span DCI	Multi-span metro
2-20 km	~120 km	100s km

800G

IMDD
800GBASE-LR

Coherent
OIF 800LR

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IMDD and coherent are likely to coexist at 800G
800LR key building block for 1.6T

Technical Comparison
800ZR and 800LR fit-for-purpose technologies

	800LR	800ZR
FEC	■ BCH2 concatenated ■ Low latency/power	■ OFEC segmented ■ Moderate (5x) power/latency
Mapping	■ 2x400GE and 800GE client support ■ Synchronous interleaving ■ Low latency variation	■ Full client 8x100GE to 1x800GE support ■ Asynchronous GMP mapping ■ High latency variation
Protocol	■ No framing ■ No OAM, rely on Ethernet PCS	■ ZR framing layer ■ OAM overhead for fault isolation
Optics	■ Fixed laser ■ No amplification	■ Tunable laser, high (10x) cost ■ Amplified and non-amplified tx power windows in discussion
Application	■ Ethernet client optics ■ O-band single client and C-band DWDM fiber relief	■ C-band DWDM only ■ Enabled muxponding and IPoDWDM applications

Bespoke 800LR and 800ZR designs; optimized for their respective applications

Refining 400ZR interop maintenance
Strengthening industry interop

Ensuring sufficient link margin for interop

Tighter definition of receiver OSNR tolerance

From 400ZR IA: Optical Parameter Definitions
"System integrations need to account for these path penalties when evaluating network performance"

Device-Under-Test (DUT) Rx OSNR tolerance explicitly defined reference to:
- Post FEC BER of 1e-15
- Specific definition of spectral width of 12.5GHz (0.1nm @ 193.7THz) as the reference bandwidth
- Back-to-back measurement between two different vendor modules over full Rx input power range

Does not include optical path impairments such as:
- multi-channel crosstalk
- chromatic dispersion, PMD, PDL
- non-linear effects,
- mux/demux optical filtering
- optical path reflections

Learnings fed into 800G projects:
- Ensure multi-vendor ROSNR has margin headroom for real-world deployment
- Tighten ROSNR definition with worst-case reference Tx

Thank you