Belden

Evolution of Intra-Datacenter Optical Connectivity

Connect to what's possible.

Intra-data center 400G Pluggable Optics

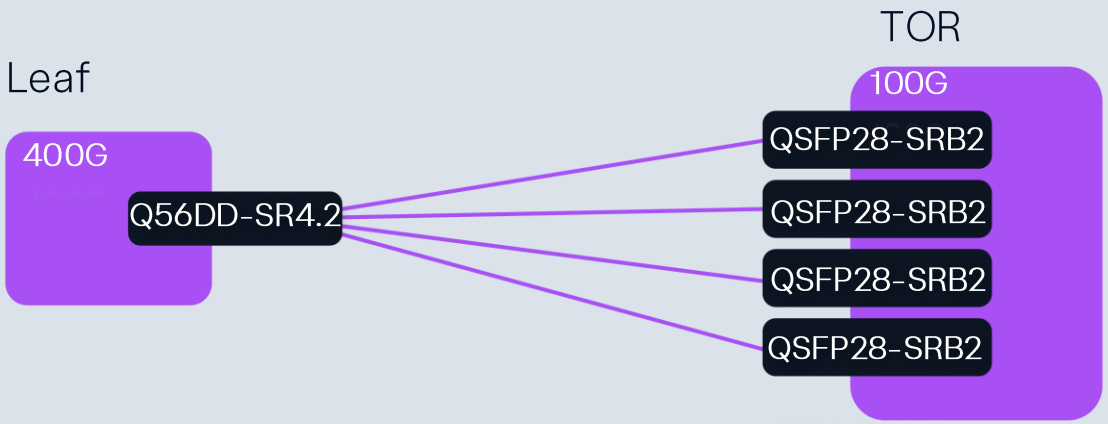
- Standard/common 400G Optics
- QSFP56-DD / OSFP 8 x 50G PAM4 Electrical interface
- 4 x 100G PAM4 Optical interface

Form Factor	Type	Max Distance	Connector
QSFP-DD/OSFP	4xDR/DR4	500m/2km	MPO-12
QSFP-DD/OSFP	4xLR/4LR1	10km	MPO-12
QSFP-DD/OSFP	FR4	2km	Duplex LC
QSFP-DD/OSFP	LR4	10km	Duplex LC
QSFP-DD/OSFP	SR4.2	150m	MPO-12

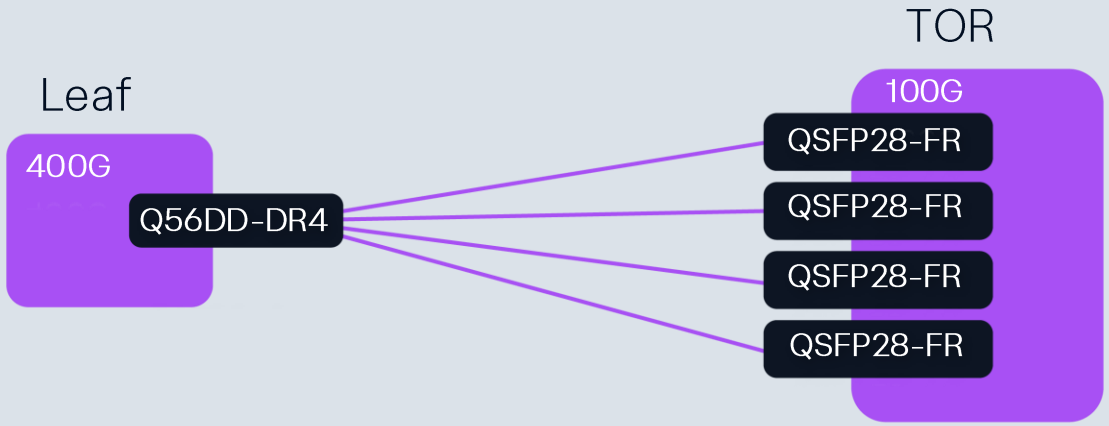
Intra-data center 400G Multi-mode Connectivity

Leaf and TOR

- 400G-SR4.2 to 4 x 100G-SRB2



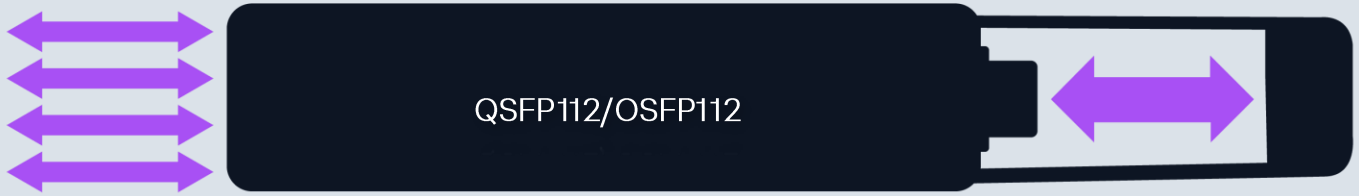
- 400G-DR4 to 4 x 100G-FR



Introduction of 100G PAM4 Electrical Interface

- Sets the scene for 800G and 1.6T optical standardisation

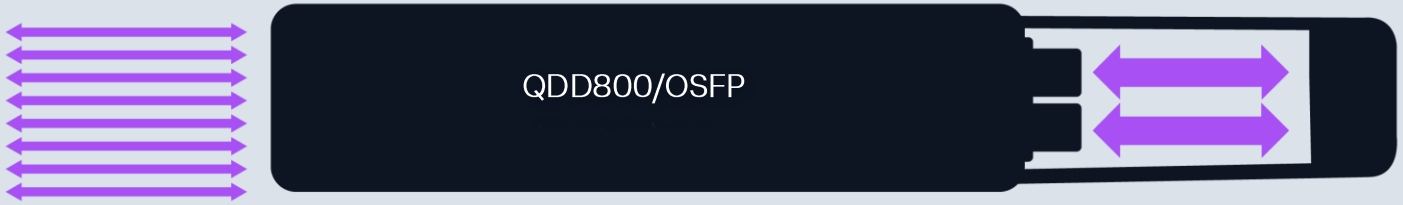
4 x 100G PAM4 Electrical Interface



4 x 100G PAM4 Optical Interface

- QSFPDD-800/OSFP800 - 800G 8 x 100G Electrical PAM4

8 x 100G PAM4 Electrical Interface

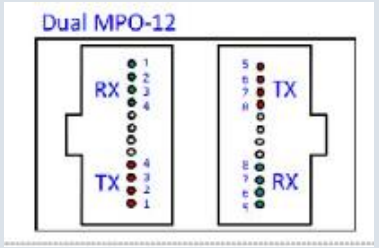


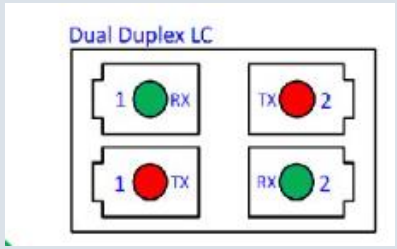
8 x 100G PAM4 Optical Interface

Intra-data center connectivity 800G Single-mode

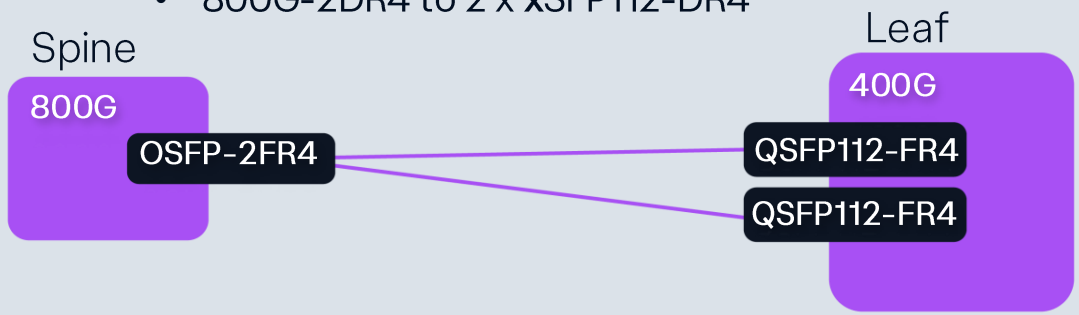
Form Factor	Type	Max Distance	Connector
QDD800/OSFP	2xDR4/8x FR	500m/2km	Dual MPO-12
QDD800/OSFP	2xFR4	2km	Dual Duplex LC
QDD800/OSFP	2xLR4	10km	Dual Duplex LC

- Introduction of dual connectors

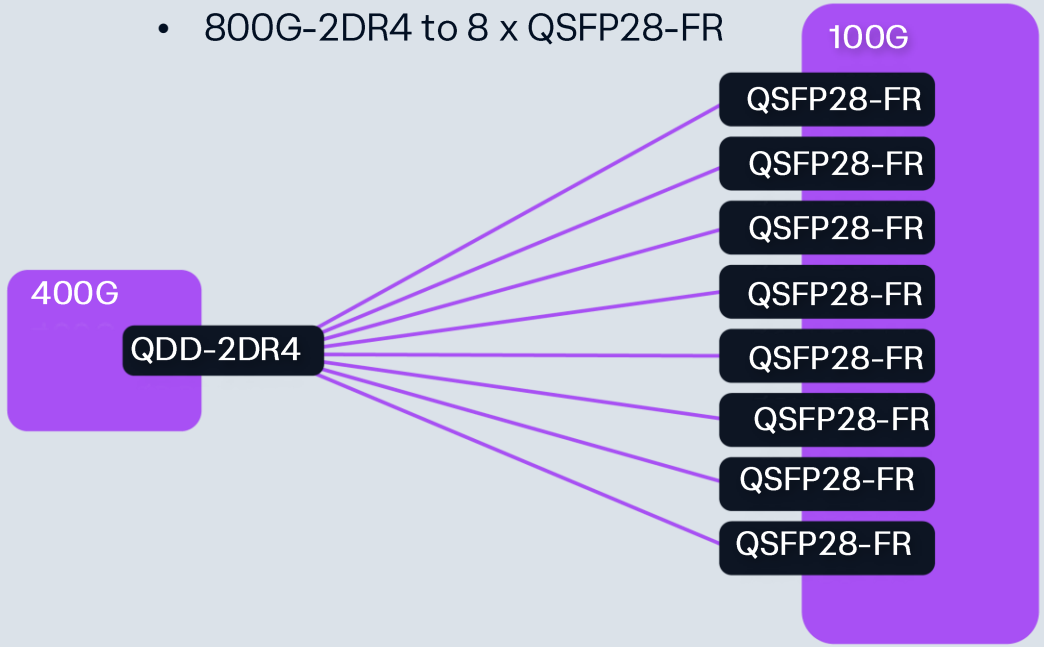




- 800G-2DR4 to 2 x xSFP112-DR4



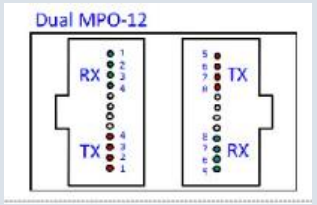
- 800G-2DR4 to 8 x QSFP28-FR



Intra-data center connectivity 800G Multi-mode

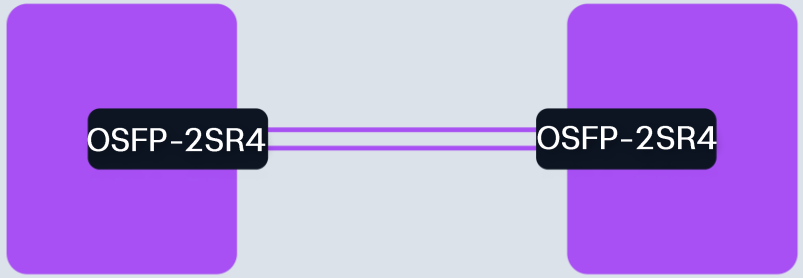
Form Factor	Type	Max Distance	Connector
QDD800/OSFP	2xSR4	50m	Dual MPO-12
QDD800/OSFP	SR8	100m	MPO-16/24
QSFP112/OSFP112	VR4/SR4	50m/100m	MPO-12

- Introduction of Dual connectors



- 800G-2SR4 to 2 x 400G112-SR4/VR4

- 800G-2SR4 to 800G-2SR4



1.6T OSFP-XD PAM4 Cont.

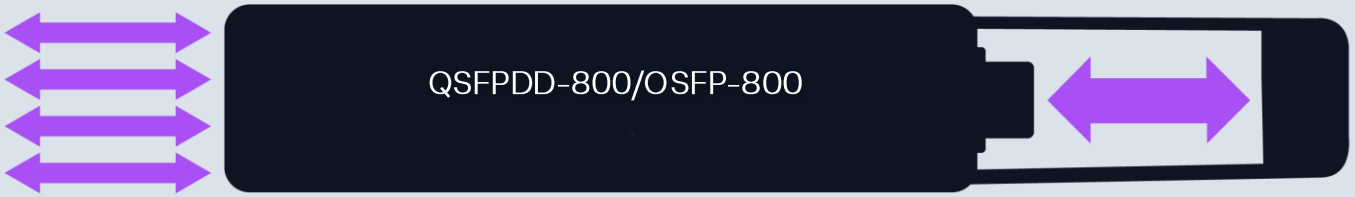
16 x 100Gb/s
PAM4 Electrical
Interface

8 x 200Gb/s PAM4
Optical Interface

Introduction of 200G PAM4 Electrical Interface

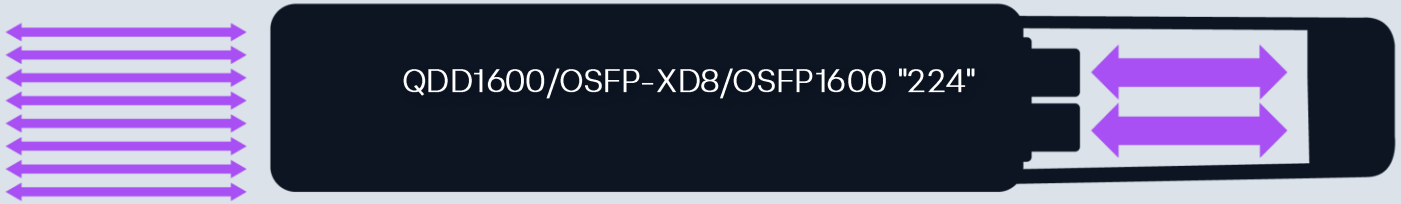
- Fundamental next step for 1.6T and 800G interconnectivity

4 x 200Gb/s
PAM4 Electrical
Interface



4 x 200Gb/s
PAM4
Optical Interface

8 x 200Gb/s
PAM4 Electrical
Interface

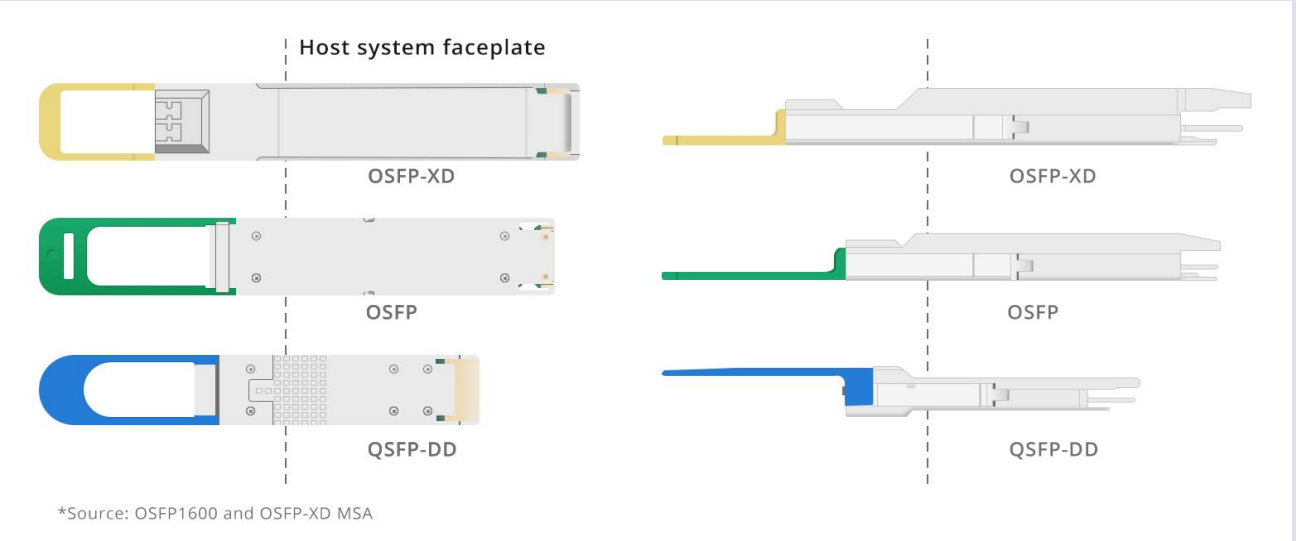


8 x 200Gb/s
PAM4
Optical Interface

OSFP-XD vs OSFP1600 "224"

OSFP1600

- 8 x 224Gb/s PAM electrical lanes
- 33W power consumption
- Same size as 400G/800G OSFP formfactor



Source: OSFP1600 and OSFP-XD MSA

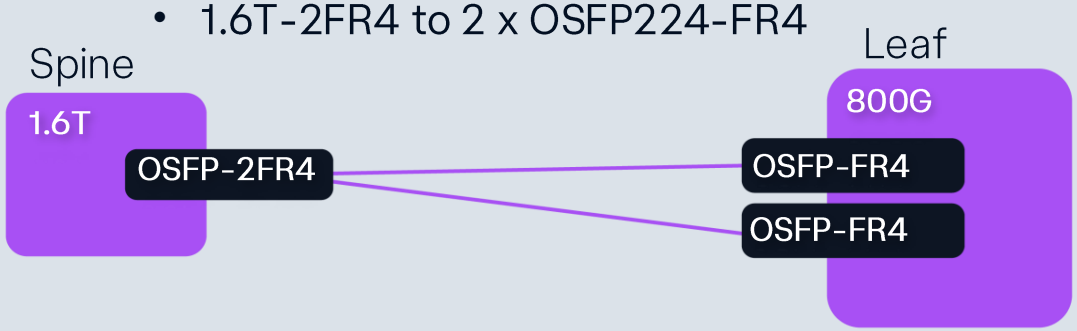
OSFP-XD

- 16 x 112Gb/s PAM4 electrical lane 1.6T
- 16 x 224Gb/s PAM4 Electrical 3.2T
- 40W power consumption- Making it the optimal choice for 1.6T/3.2T ZR coherent
- Can support 8 x 224 Electrical, known as XD-8
- Larger form factor

Intra-data center connectivity 1.6 Single-mode

Form Factor	Type	Max Distance	Connector
QDD800/OSFP	2xDR4/8x FR	500m/2km	Dual MPO-12
QDD800/OSFP	2xFR4	2km	Dual Duplex LC

- 1.6T-2FR4 to 2 x OSFP224-FR4



- 1.6G-4FR2 to 4 x 400G-FR2

- OSFPXD-4FR2 (4 X 400G)
- OSFP-FR2 (400G)

Linear Pluggable Optics

The drive for more data and less power consumption has rapidly pushed forward the development of LPO.

What is different about LPO?

- Removal of the Digital signal processor (DSP) & Clock data recovery chip (CDR)
- DSP functionality is handed off the host platform chip.
- LPO is left with Driver + CTLE & TIA + EQ – Reduced latency, power consumption, lower manufacturing cost vs DSP based solution

What are the challenges of LPO?

- Standarisation
- Limited to shorter distance vs DSP
- Closed system links
- Host vendor platform requires LPO support

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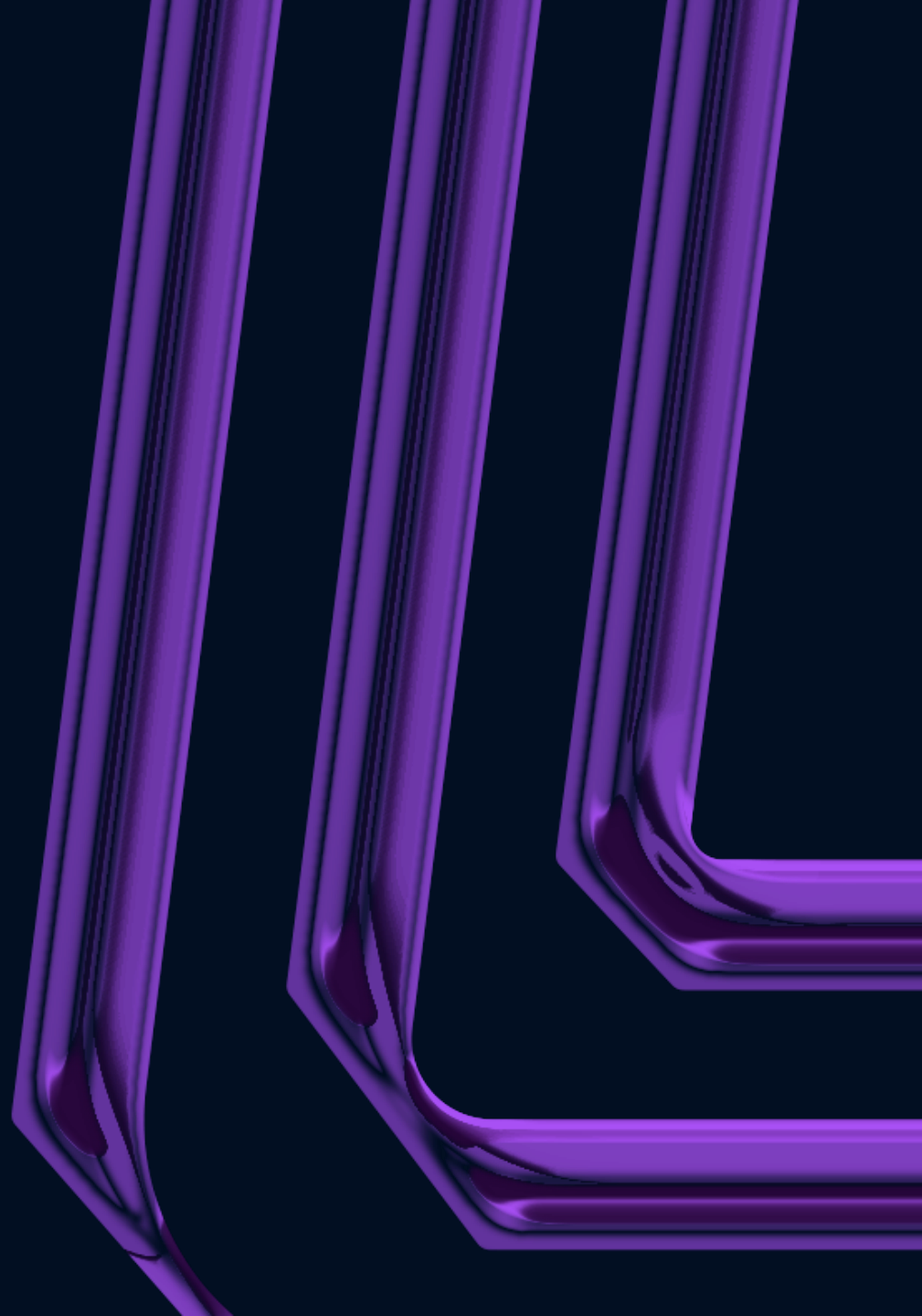
Questions?

Tyron Johnson | Director of Solutions Engineers EMEA



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Thank You

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