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Baseline for 400GE 2km and 10km SMF PMD

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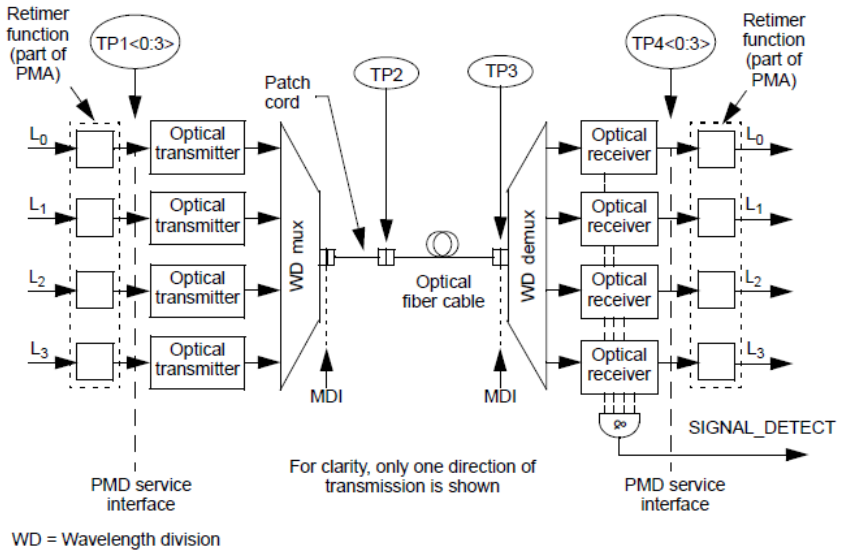
This presentation

Withdrawn

We show 2-km and ~~10-km~~ SMF PMD baseline specification.

Will be merged with mason_3bs_01_1114

- ✓ In both cases we use 4-lane wavelength Division multiplexing (WDM)
- ✓ Each lane transmits and receives 100Gbit/s data using digital-based PAM4



Block Diagram

In this proposal, we consider both wide-band and narrow-band channel cases. (Please see Hirai_3bs_01_1114 in detail.)

Lane assignment

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400GBASE-FR4

Lane	Center wavelength	Wavelength range
L0	1271 nm	1264.5 – 1277.5 nm
L1	1291 nm	1284.5 – 1297.5 nm
L2	1311 nm	1304.5 – 1317.5 nm
L3	1331 nm	1324.5 -1337.5 nm

400GBASE-LR4

Lane	Center frequency	Center wavelength	Wavelength range
L0	231.4 THz	1295.56 nm	1294.53 – 1296.59 nm
L1	230.6 THz	1300.05 nm	1299.02 – 1301.09 nm
L2	229.8 THz	1304.58 nm	1303.54 – 1305.63 nm
L3	229.0 THz	1309.14 nm	1308.09 – 1310.19 nm

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400GBASE-xR4 transmit characteristics

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Description	400GBASE-FR4	400GBASE-LR4	Unit	Remark
Signaling speed per lane	56		GBd	Assumed FEC limit BER ~2E-3
Lane wavelength (range)	1264.5 -1277.5 1284.5 -1297.5 1304.5 -1317.5 1324.5 -1337.5	1294.53 - 1296.59 1299.02 - 1301.09 1303.54 - 1305.63 1308.09 - 1310.19	nm	
Transmitter eye mask definition	TBD			
Difference in launch power between any two lanes (max)	3.0		dB	
Average launch power, per lane (max)	+3.1	+4.3	dBm	
Average launch power, per lane (min)	+0.1	+1.3	dBm	
Optical Modulation Amplitude (OMA), per lane (max)	+3.5	+4.7	dBm	
Optical Modulation Amplitude (OMA), per lane (min)	+0.5	+1.7	dBm	
Average launch power of OFF transmitter, per lane (max)	-30		dBm	
RIN OMA (max)	-140		dB/Hz	
Optical Return Loss Tolerance	20		dB	
Transmitter Reflectance (max)	-12		dB	

400GBASE-xR4 receive characteristics

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Description	400GBASE-FR4	400GBASE-LR4	Unit	Remark
Signaling speed per lane	56		GBd	Assumed FEC limit BER ~2E-3
Lane wavelength (range)	1264.5 -1277.5 1284.5 -1297.5 1304.5 -1317.5 1324.5 -1337.5	1294.53 - 1296.59 1299.02 - 1301.09 1303.54 - 1305.63 1308.09 - 1310.19	nm	
Difference in receive power between any two lanes (max)	4.0		dB	
Receive power, per lane (OMA) (max)	+3.5	+4.7	dBm	
Average receive power, per lane (max)	+3.1	+4.3	dBm	
Average receive power, per lane (min)	-5.4	-7.0	dBm	
Return loss (min)	-35		dB	
Receive sensitivity (OMA), per lane (max)	-5.0	-6.6	dBm	
Stressed receive sensitivity (OMA), per lane	-3.5	-4.6	dBm	
Vertical eye closure penalty, per lane	1.5	2.0	dB	

400GBASE-xR4 link power budget

Description	400GBASE -FR4	400GBASE -LR4	Unit
Power budget	5.5	8.3	dB
Operating distance	2	10	km
Channel insertion loss	4.0	6.3	dB
Maximum Discrete Reflectance (max)	-35	-35	dB
Allocation for penalties	1.5	2.0	dB
Additional insertion loss allowed	0	0	dB

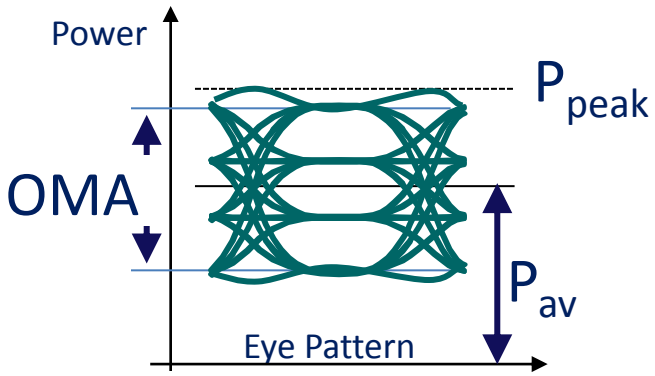
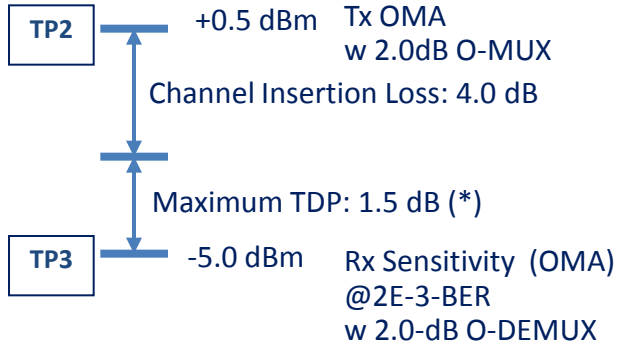
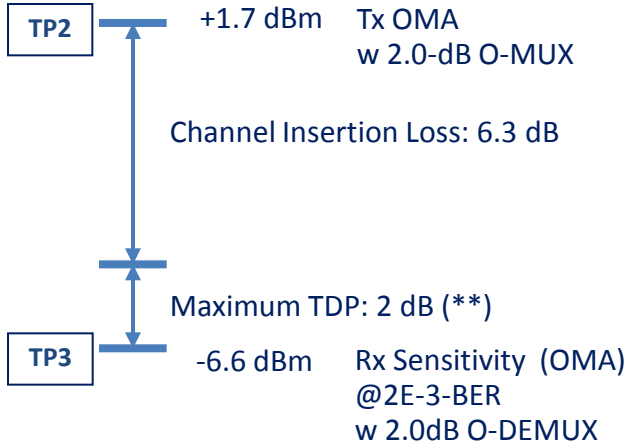


Fig. Definition of P_{av} and OMA

400GBASE-FR4 (2km) (TDP max)



400GBASE-LR4 (10km) (TDP max)



(*) Maximum TDP value includes 0.2 dB CD penalty and 1.3dB other penalties (under consideration).

(**) Maximum TDP value includes 0.7 dB CD penalty and 1.3dB other penalties (under consideration).

Thank you