

# **100G CWDM Link Attributes**

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# 100G CWDM Link Attributes

## Presentation Objectives:

- Consider a solution for the 802.3bm 500 m SMF objective based on CWDM using directly modulated (DM) DFB lasers.

## Reference:

- Example 100G CWDM Link Model (petrilla\_03\_0413\_smf), found at [http://www.ieee802.org/3/bm/public/smfadhoc/meetings/apr16\\_13/petrilla\\_03\\_0413\\_smf.xlsx](http://www.ieee802.org/3/bm/public/smfadhoc/meetings/apr16_13/petrilla_03_0413_smf.xlsx)

## Conclusions:

- Links of 500 m SMF operating at a maximum BER of  $10^{-12}$  appear feasible based on a 7.4 dB signal power budget assuming retimers with the same retimer performance in the Tx and Rx as assumed for 100G SR4 links and 100G PSM4 links.
  - The 500 m link insertion loss allocation is based on kolesar\_02\_0313\_optx found at [http://www.ieee802.org/3/bm/public/mar13/kolesar\\_02\\_0313\\_optx.pdf](http://www.ieee802.org/3/bm/public/mar13/kolesar_02_0313_optx.pdf)
  - The min Tx ORL of 12 dB and min Rx ORL of 20 dB supports operation including at least four inline connectors with 35 dB ORL providing robust performance.

# Fiber Optic Link Interfaces

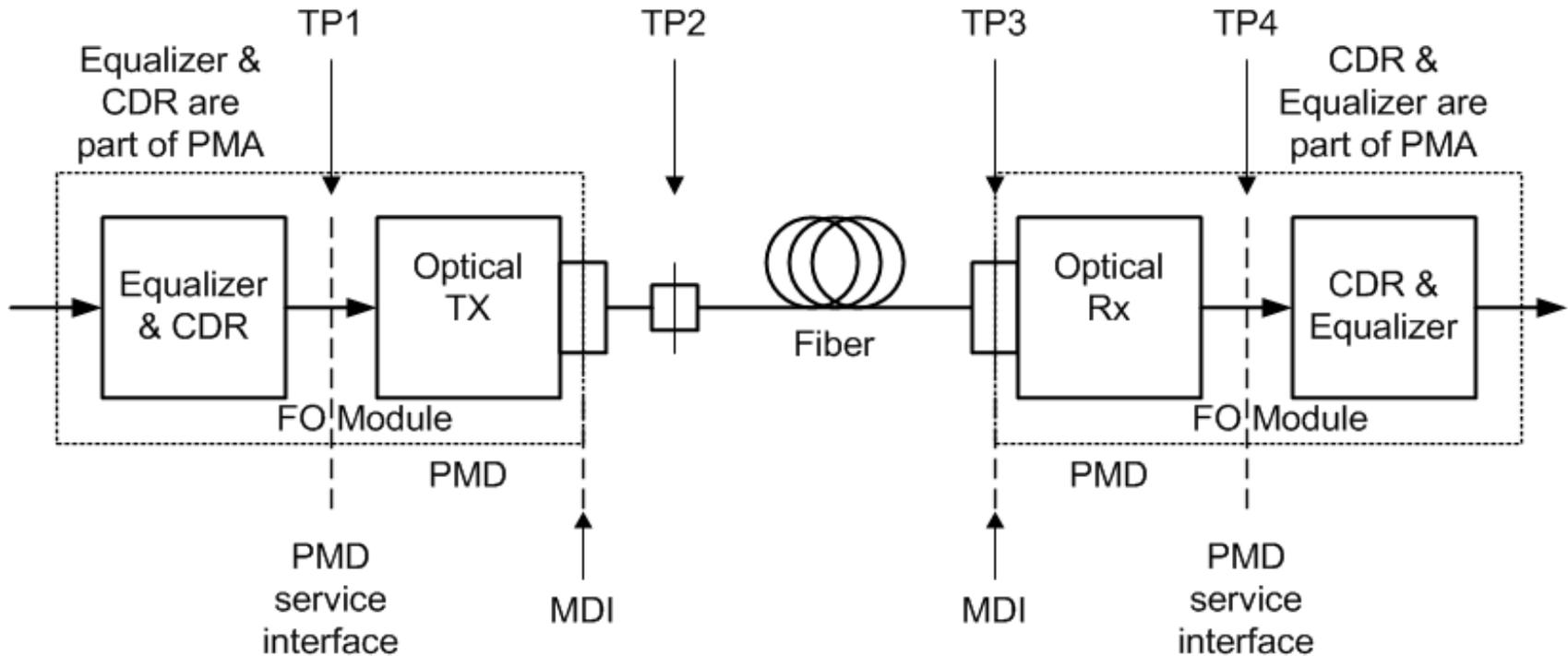


Figure 1

- For cases, as shown above in Figure 1, where retimers are incorporated in the optical module, the PMD service interface is not exposed. TP1 and TP4 remain as points on the PMD service interface and, consequently not exposed.
- The high speed signal inputs and outputs of the optical module are expected to be defined by CAUI-4.

# 100G CWDM illustrative link power budget

Parameter	Unit	vlasov_01a_0313_optx	petrilla_02a_0413_smf
Power budget (for max TDP)	dB	6.2	7.4
Operating distance	km	0.5	0.5
Channel insertion loss	dB	4.0 [a]	4.0 [1]
Max discreet reflectance	dB	-26	-35 [2]
Allocation of penalties (for max TDP)	dB	2.2 [b]	3.4 [3]
Additional insertion loss allowed	dB	0	0

## NOTES:

[a] The channel insertion loss is calculated using maximum distance of 0.5km and fiber attenuation of 0.5dB/km at 1264.5nm plus an allocation for connection and splice loss of 3.75dB

[b] Assumes 1dB CD max penalty and 1.2dB other penalties following Isono\_01\_0708; Cole\_01\_0708 (see also backup material)

[1] The channel insertion loss is calculated using maximum distance of 0.5km and fiber attenuation of 0.5dB/km at 1310 nm plus an allocation for connection and splice loss of 3.725 dB.

[2] The link model includes the effect of four 35 dB ORL inline connectors with a 20 dB ORL receiver, equivalent to a single point reflection of -14.1 dB.

[3] From Example 100G CWDM Link Model.

# 100G CWDM transmit characteristics

Parameter	Unit	vlasov_01a_0313_optx	petrilla_02a_0413_smf
Signaling rate, each lane (range)	GBd	25.78125 ± 100 ppm	25.78125 ± 100 ppm
Average launch power, each lane (max)	dBm	3	
Average launch power, each lane (min)	dBm	-4.3	-6.1
Optical modulation amplitude (OMA), each lane (max)	dBm	3	
Optical modulation amplitude (OMA), each lane (min)	dBm	-1.3	-3.1
Difference in launch power between any two lanes (OMA), (max)	dB	4	TBD
Launch power in OMA minus TDP, each lane, (min)	dBm	-2.3	-4.1
Transmitter and dispersion penalty (TDP), each lane (max)	dB	2.2	3.4
Extinction ratio (min)	dB	4	4
RIN <sub>20OMA</sub> (max)	dB/Hz	-130	-130
Optical return loss tolerance (max)	dB	20	14.1 [1]
Transmitter reflectance (max)	dB	-12	-12
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}		{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}	TBD

## NOTES:

[1] The link model includes the effect of four 35 dB ORL inline connectors with a 20 dB ORL receiver, equivalent to a single point reflection of -14.1 dB. For comparison, the single point reflection equivalent of a 26 dB ORL Rx with four 35 dB ORL inline connectors is -18.3 dB and with four 26 dB ORL inline connectors is -10.8 dB.

# 100G CWDM receiver characteristics

Parameter	Unit	vlasov_01a_0313_optx	petrilla_02a_0413_smf
Signaling rate, each lane (range)	GBd	25.78125 ± 100 ppm	25.78125 ± 100 ppm
Receiver sensitivity (OMA), each lane (max)	dBm	-6.3	-8.1
Receiver reflectance (max)	dB		-20 [1]
Stressed receiver sensitivity, each lane (OMA)	dBm		TBD
Conditions of stressed receiver sensitivity test			TBD

## NOTES:

[1] The link model includes the effect of four 35 dB ORL inline connectors with a 20 dB ORL receiver.

# 100G CWDM illustrative link jitter budget

Parameter	Unit	vlasov_01a_0313_optx	petrilla_02a_0413_smf
Signaling rate, each lane (range)	GBd	25.78125 ± 100 ppm	25.78125 ± 100 ppm
Q (BER)			7.034 (10 <sup>-12</sup> )
TP1 RJ RMS tolerance, min	UI		0.0079
TP1 DJ (dual Dirac) tolerance, min	UI		0.11
TP3 DJ (dual Dirac) tolerance, min	UI		0.165
TP3 DCD tolerance, min	UI		0.05
TP4 J2, max	UI		0.385
TP4 TJ at BER, max	UI		0.78

TP1 and TP4 jitter allocations are based on the same retimer assumptions as for the retimers for 100G SR4 and 100G PSM4.