

100G 100m MMF TDP

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100G 100m Transceivers Summary

Presentation Objectives:

- Discuss TDP setup and requirements for 100G 100m MMF Tx

Link Model Reference

<http://www.avagotech.com/docs/AV02-2485EN>

Fiber Optic Links Interfaces

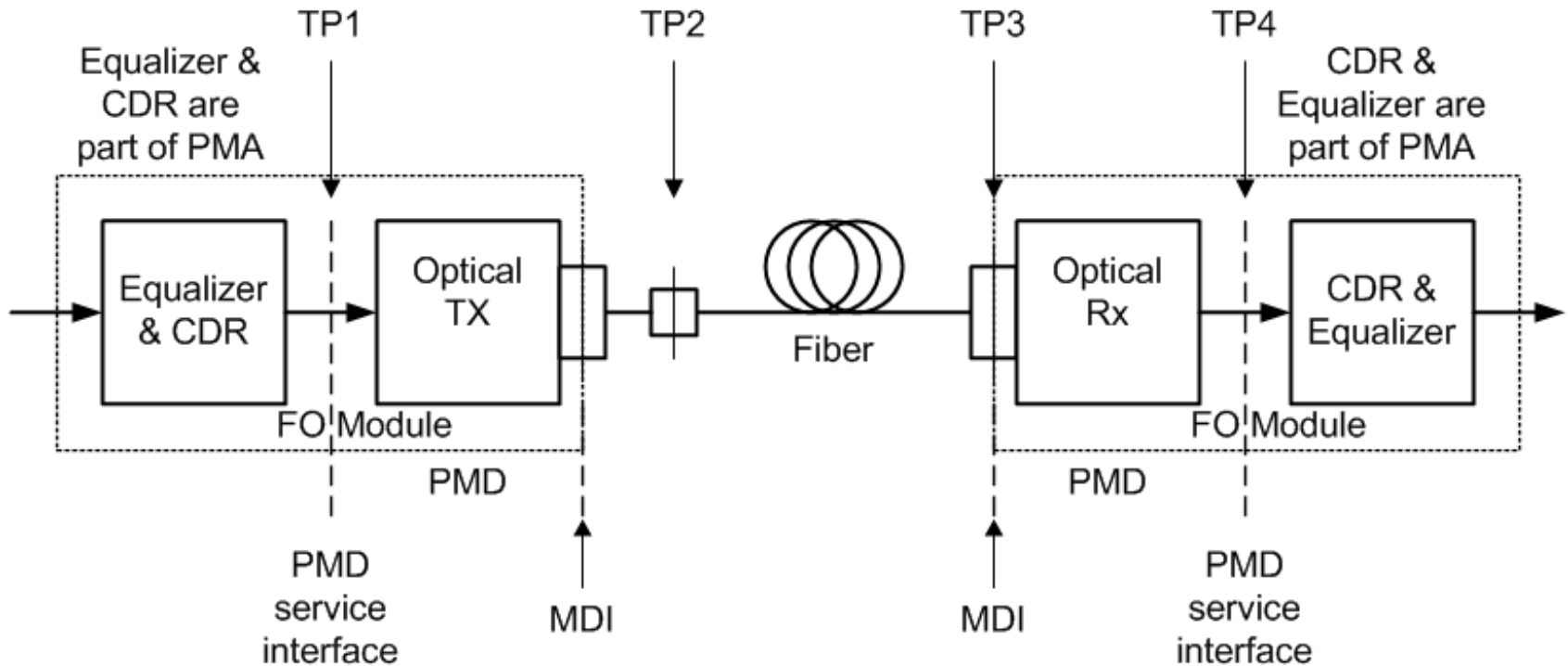


Figure 1

- For cases, as shown above in Figure 1, where retimers are embedded 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 SR4: Updates and Comments

Optical Link Update Overview

- Reduced Q for the MMF link from $Q_0 = 7.034$ for a $BER = 10^{-12}$ to $Q_i = 3.8905$ yielding a $BER = 5.0 \times 10^{-5}$, corresponding to the benefit from KR4 FEC, enhances the Rx sensitivity by $10\text{Log}(Q_0/Q_i) = 2.57 \text{ dB}$ and provides a larger signal power budget, now 8.2 dB . Rx Sensitivity now -11.2 dB

100G SR4 with KR4 FEC: Example Link Model Tx Attributes (each lane)

Parameter	Unit	100G SR4	
Signal rate	GBd	25.78125	
Q (BER)		3.8905 (5.0E-5)	FEC corrects BER to < 1.0E-12
Center Wavelength, min	nm	840	
Spectral Width, max	nm	0.60	
OMA at max TDP, min	dBm	-3.0	
Extinction ratio, min	dB	3.0	Previously 4.0
Tx output transition times, 20% -80%, max	ps	21	
RIN ₁₂ OMA, max	dB/Hz	-128	
RIN coefficient		0.7	
MPN coefficient		0.3	
Modal Noise Penalty	dB	0.129	Scaled with Q
Tx reflectance, max	dB	-12	
Tx optical return loss tolerance, max	dB	12	

Attributes and values in the above table are provided in order to populate example link models and are not presented as specification recommendations.

100G SR4 with KR4 FEC: Example Link Model Ch Attributes (each lane)

Parameter	Unit	100G SR4	
Signal rate	GBd	25.78125	
Q (BER)		3.8905 (5.0E-5)	FEC corrects BER to < 1.0E-12
Reach	m	106	Previously 100
Fiber Attenuation	dB/km	3.5	For 850 nm center wavelength
Dispersion min Uo	nm	1316	
Dispersion So	ps/nm ² km	0.10275	
Fiber modal bandwidth	MHz·km	4400	For 840 nm center wavelength
Reflection Noise Factor		0	
Signal power budget at max TDP	dB	8.20	Model output
Connector & splice loss allocation	dB	1.50	
Fiber Insertion loss	dB	0.38	Model output
Allocation for penalties at max TDP	dB	4.24	Model output
Allocation for target TP4 eye at max TDP	dB	2.08	Model output
Additional insertion loss allowed	dB	0	Model output

Attributes and values in the above table are provided in order to populate example link models and are not presented as specification recommendations. Various model outputs are provided.

100G SR4 with KR4 FEC: Example Link Model Jitter Attributes (each lane)

Parameter	Unit	100G SR4	
Signal rate	GBd	25.78125	
Q (BER)		3.8905 (5.00E-5)	FEC corrects BER to < 1.0E-12
TP1 RJrms tolerance, min	UI	0.0079	
TP1 DJ tolerance, min	UI	0.11	
TP3 DCD tolerance, min	UI	0.05	
TP3 DJ tolerance, min	UI	0.225	
TP4 J2, max	UI	0.438	Model output
TP4 TJ at BER, max	UI	0.780	Model output

Attributes and values in the above table are provided in order to populate example link models and are not presented as specification recommendations. Various model outputs are provided.

Nomenclature: Terms TP1, TP2, TP3 and TP4 are used as defined in 802.3 clause 86 and shown in above Figure 1. Note that TP1 is downstream of the input CDR and equalizer for an optical transmitter.

100G SR4 with KR4 FEC: Example Ref Tx Attributes

Parameter	Unit	100G SR4	
Signal rate	GBd	25.78125	
Q (BER)		3.8905 (5.0E-5)	FEC corrects BER to < 1.0E-12
Center Wavelength	nm	860	
Spectral Width	nm	0.05	
OMA at max TDP	dBm	-3.0	
Extinction ratio	dB	3.0	
Tx output transition times, 20% -80%	ps	1	
RIN ₁₂ OMA	dB/Hz	-128	
RIN coefficient		0.0	
MPN coefficient		0.3	
Modal Noise Penalty	dB	0	
Tx reflectance, max	dB	-12	
Tx optical return loss tolerance, max	dB	12	

Attributes and values in the above table are provided in order to populate example link models and are not presented as specification recommendations.

100G SR4 with KR4 FEC: Example Ref Rx Attributes

Parameter	Unit	100G SR4	
Signal rate	GBd	25.78125	
Q (BER)		3.8905 (5.0E-5)	FEC corrects BER to < 1.0E-12
Wavelength, min	nm	840	
Ref Rx sensitivity (OMA)	dBm	-14.60	-12.03 dBm at Q = 7.034
Rx Bandwidth	MHz	19,336	
RMS base line wander coefficient		0	
Rx reflectance, max	dB	-12	

Attributes and values in the above table are provided in order to populate example link models and are not presented as specification recommendations.

100G SR4 with KR4 FEC: Example Ref Tx Rx Jitter Attributes

Parameter	Unit	100G SR4	
Signal rate	GBd	25.78125	
Q (BER)		3.8905 (5.0E-5)	FEC corrects BER to < 1.0E-12
TP1 RJrms	UI	0	
TP1 DJ	UI	0	
TP3 DCD	UI	0	
TP3 DJ	UI	0	
Attenuation (aka Connector loss)	dB	11.50	Adjusted to yield zero margin
TP4 TJ at BER, max	UI	0.780	Model output

Attributes and values in the above table are provided in order to populate example link models and are not presented as specification recommendations. Various model outputs are provided.

Nomenclature: Terms TP1, TP2, TP3 and TP4 are used as defined in 802.3 clause 86 and shown in above Figure 1. Note that TP1 is downstream of the input CDR and equalizer for an optical transmitter.

100G SR4 with KR4 FEC: Example Ref Ch Attributes (each lane)

Parameter	Unit	100G SR4	
Signal rate	GBd	25.78125	
Q (BER)		3.8905 (5.0E-5)	FEC corrects BER to < 1.0E-12
Reach	m	2	
Fiber Attenuation	dB/km	0.0	For 850 nm center wavelength
Dispersion min Uo	nm	1316	
Dispersion So	ps/nm ² km	0.10275	
Fiber modal bandwidth	MHz·km	2000	
Reflection Noise Factor		0	
Signal power budget at max TDP	dB	11.60	Model output
Fiber Insertion loss	dB	0.00	Model output
Attenuation (aka Connector loss)	dB	6.48	Adjusted to yield zero margin
Rx Bandwidth for TDP	MHz	11656	Adjusted to match P _{tot} of Ref Ch with 106 m of OM4
TDP	dB	5.02	

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