Baseline Proposal for 100GBASE-BR40

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Background

- At the interim meeting we discussed on PMD specifications for 100GBASE-BR40.
- We propose baseline based on the previous discussion.

- In this contribution,
  - Parameters proposed in this contribution are indicated in red.
  - Parameters proposed previously our contributions are indicated in blue.
  - Parameters that need to be discussed are highlighted in yellow.

100GBASE-BR40 Transmit characteristics

Description	100GBASE-BR40	Unit
Signaling rate (Range)	53.125 ± 100 ppm	Gbd
Modulation Format	PAM4	—
100GBASE-BRx-D Center wavelength (Range)	1308.1 to 1310.1	nm
100GBASE-BRx-U Center wavelength (Range)	1303.6 to 1305.6	nm
Side-mode suppression ratio (SMSR), (min)	30	dB
Average launch power (max)	+8.5	dBm
Average launch power[a] (min) : informative	+2.7	dBm
Outer Optical Modulation Amplitude (OMA_{outer}) (max)	8.7	dBm
Outer Optical Modulation Amplitude (OMA_{outer}) (min) [b] : for TDECQ < 1.4 dB for 1.4 dB ≦TDECQ ≦ 3.9 dB or TDECQ (max)	 5.7 4.3 + TDECQ	dBm
Transmitter and dispersion eye closure for PAM4 (TDECQ) (max)	3.9	dB
TECQ (max)	3.9	dB
|TDECQ – TECQ | (max)	2.7	dB

100GBASE-BR40 Transmit characteristics(continued)

Description	100GBASE-BR40	Unit
Transmitter over/under -shoot (max)	22	%
Transmitter power excursion (max)	TBD (*1)	dBm
Average launch power of OFF transmitter (max)	-15	dBm
Extinction ratio (min)	5.0	dB
Transmitter transition time (max)	17	ps
RIN_xOMA (max)[c]	-136	dB/Hz
Optical return loss tolerance (max)	15.6	dB
Transmitter reflectance[d] (max)	-26	dB

a Average launch power (min) is not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance.
b The OMAouter (min) requirement holds even if the TDECQ < 1.4 dB. Even though the representation of the OMAouter requirement is different from that in Clause 139, they are consistent.
c In RINxOMA, “x” is the optical return loss tolerance (max) for the PHY under test.
d Transmitter reflectance is defined looking into the transmitter.
*1 5.4 dBm in 100G lambda MSA 100G-ER1-40.

100GBASE-BR40 Receive characteristics

Description	100GBASE-BR40	Unit
Signaling rate (Range)	53.125 ± 100 ppm	Gbd
Modulation Format	PAM4	—
100GBASE-BRx-D Center wavelength (Range)	1308.1 to 1310.1	nm
100GBASE-BRx-U Center wavelength (Range)	1303.6 to 1305.6	nm
Damage threshold[a]	TBD	dBm
Average receive power (max)	TBD	dBm
Average receive power[b] (min)	-15.3	dBm
Receive power (OMA_{outer}) (max)	TBD	dBm
Receiver reflectance (max)	-26	dB
Receiver sensitivity(OMA_{outer})[c](max) for TECQ < 1.4 dB for 1.4 dB ≦TECQ ≦ 3.9 dB or TDECQ (max)	 -12.8 -14.2 + TECQ	dBm
Stressed receiver sensitivity (OMA_{outer}) [d] (max)	TBD	dBm
Conditions of stressed receiver sensitivity test:[e]		
Stressed eye closure for PAM4 (SECQ)	3.9	dB

[a] The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level.
[b] Average receive power (min) is not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance
[c] Receiver sensitivity (OMAouter) (max) is optional and is defined for a transmitter with a value of SECQ up to 3 dB for 100GBASE-BR10 and 3.2 dB for 100GBASE-BR20, and 100GBASE-BR40.
[d] Measured with conformance test signal at TP3 (see 999.7) for the BER specified in 999.1.1
[e] These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

100GBASE-BR40 illustrative link power budgets

Description	100GBASE-BR40	Unit
Power budget (for maximum TDECQ)	22.4	dB
Operating distance	40	km
Channel insertion loss	18[a]	dB
Maximum discrete reflectance	-35	dB
Allocation for penalties[b] (for maximum TDECQ)	4.4	dB

[a] The channel insertion loss is calculated using the maximum distance specified in Table 999–5 for 100GBASE-BR10 and 100GBASE-BR40 and fiber attenuation of 0.4 dB/km plus an allocation for connection and splice loss given in 999.10.2.1.

[b] Link penalties are used for link budget calculations. They are not requirements and are not meant to be tested.

100GBASE-BR40 Fiber optic cabling (channel) characteristics

Description	100GBASE-BR40	Unit
Operating distance (max)	40	km
Channel insertion loss[a,b] (max)	18	dB
Channel insertion loss (min)	10	dB
Positive dispersion[b] (max)	37	ps/nm
Negative dispersion[b] (min)	-77	ps/nm
DGD_max[c]	TBD	ps
Optical return loss (min)	22	dB

[a] These channel insertion loss values include cable, connectors, and splices.
[b] Over the wavelength range 1303.6 nm to 1310.1 nm.
[c] Differential Group Delay (DGD) is the time difference at reception between the fractions of a pulse that were transmitted in the two principal states of polarization of an optical signal. DGD_max is the maximum differential group delay that the system is required to tolerate

100GBASE-BR40 Fiber optic cabling (channel) characteristics(Continued)

Reference

PMD type	Dispersion[a] (ps/nm)		Insertion loss[b]	Optical return loss[c]	Max mean DGD
	Minimum	Maximum			
100GBASE-BR10	$0.23 \times \lambda \times [1 - (1324 / \lambda)^4]$	$0.23 \times \lambda \times [1 - (1300 / \lambda)^4]$	Minimum	15.6	5
100GBASE-BR20	$0.46 \times \lambda \times [1 - (1324 / \lambda)^4]$	$0.46 \times \lambda \times [1 - (1300 / \lambda)^4]$	Minimum	TBD	TBD
100GBASE-BR40	$0.92 \times \lambda \times [1 - (1324 / \lambda)^4]$	$0.92 \times \lambda \times [1 - (1300 / \lambda)^4]$	Minimum	TBD	TBD

Thank You!