10GBase-BR40-D, +-D, -U, +-U

Proposed specs changes to IEEE802.3cp D1.1

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22 Jan 2020

Outline

- Introduction
- Current draft and industry de-facto specification comparison
- Link Model
- Summary of proposed key changes
- Vendor Datasheets.

Introduction

- Products have been on the market for some time designed to address the same applications as 10GBASE-BR10/20/40 is targeting
- For 10GBASE-BR40 there are a number of suppliers that support this reach, but the spec's are different than the current draft
- For the IEEE requirement to have relevance, it should consider specifications that are already deployed and should have a reason to diverge

Requirements and Industry Specifications Review of 10GBASE-BR40-D

		Cisco	Molex/Oplink	Huawei
10GBASE-BR40-D	Table 158-6	Proposal	TRBCXGKxEx000E2G	SFP-10G-ER-SM1310-BiDi
Average Launch Power (Max)	-0.6	5	5	5
Average Launch Power (Min)	-6.6	-2.7	0	0
Launch Power (Min) OMA minus TPD	-4.6	-0.5		
OMA (Min)	-3.6	0.3	0	
Tx and Dispersion Penalty	3	2.6		
Average Launch Power of Off Tx	-30	-30		
Extinction ratio	3	5.5		>3.5

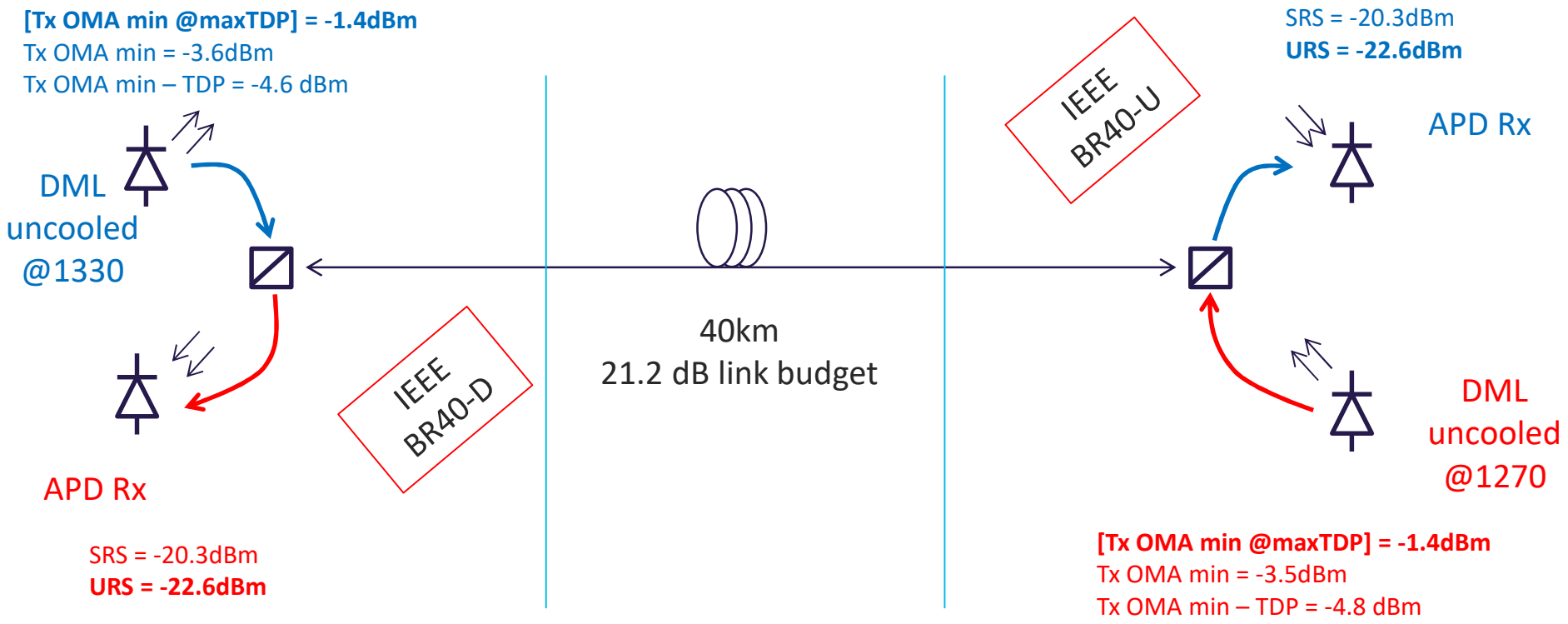
		Cisco	Molex/Oplink	Huawei
10GBASE-BR-D Rx Characteristics	Table 158-8	Proposal	TRBCXGKxEx000E2G	SFP-10G-ER-SM1270-BiDi
Average Rx Power (Max)	-5.6	-9	-9	-9
Average Rx Power (Min)	-24.4	-21.2	-21.2	
Max Rx Power (for damage)	4	4		
Rx Sensitivity (max) in OMA	(-22.6)	-19	-19	-18
Receiver Reflectance	-26	-26	-21	
Stressed Rx Sensitivity (Max in OMA)	(-20.3)	-16.8		

Requirements and Industry Specifications Review of 10GBASE-BR40-U

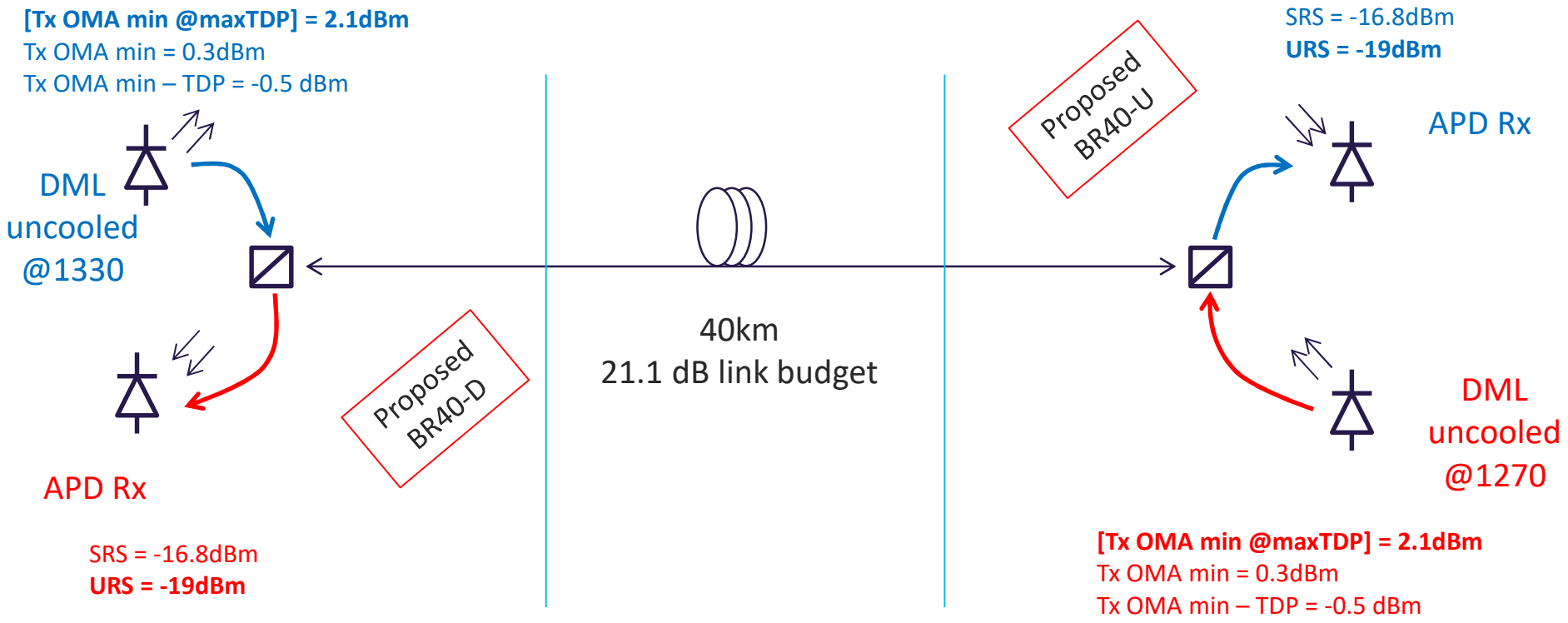
		Cisco	Molex/Oplink	Huawei
10GBASE-BR40-U Tx Characteristics	Table 158-7	Proposal	TRBCXGKxEx00 0E2G	SFP-10G-ER-SM1270-BiDi
Average Launch Power (Max)	4	5	5	5
Average Launch Power (Min)	-6.4	-2.7	0	0
Launch Power (Min) OMA minus TPD	-4.8	-0.5		
OMA (Min)	-3.5	0.3	0	
Tx and Dispersion Penalty (max)	3	2.6		
Average Launch Power of Off Tx	-30	-30		
Extinction ratio	3	5.5		>3.5

		Cisco	Molex/Oplink	Huawei
10GBASE-BR-U Rx Characteristics	Table 158-8	Proposal	TRBCXGKxEx00 0E2G	SFP-10G-ER-SM1270-BiDi
Average Rx Power (Max)	-10	-9	-9	-9
Average Rx Power (Min)	-24.4	-21.2	-21.2	
Max Rx Power (for damage)	4	4		
Rx Sensitivity (max) in OMA	(-22.6)	-19	-19	-18
Receiver Reflectance	-26	-26	-21	
Stressed Rx Sensitivity (Max in OMA)	(-20.3)	-16.8		

Current Draft Link Budget BR40-D vs -U



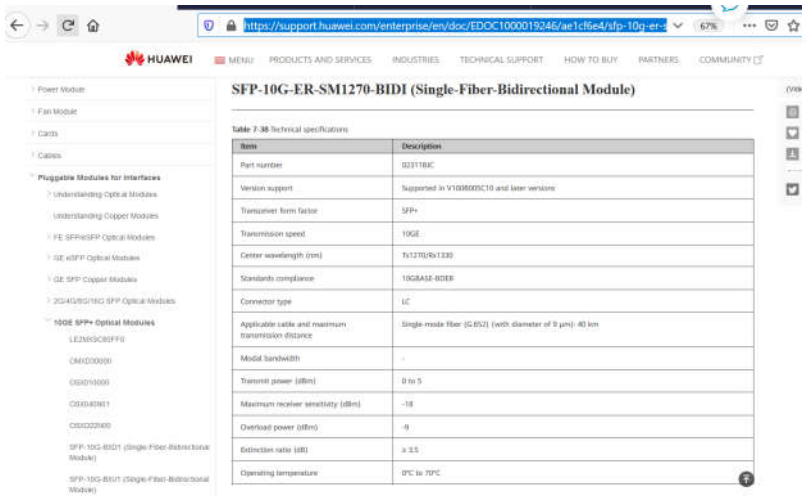
Proposed Link Budget BR40-D vs -U

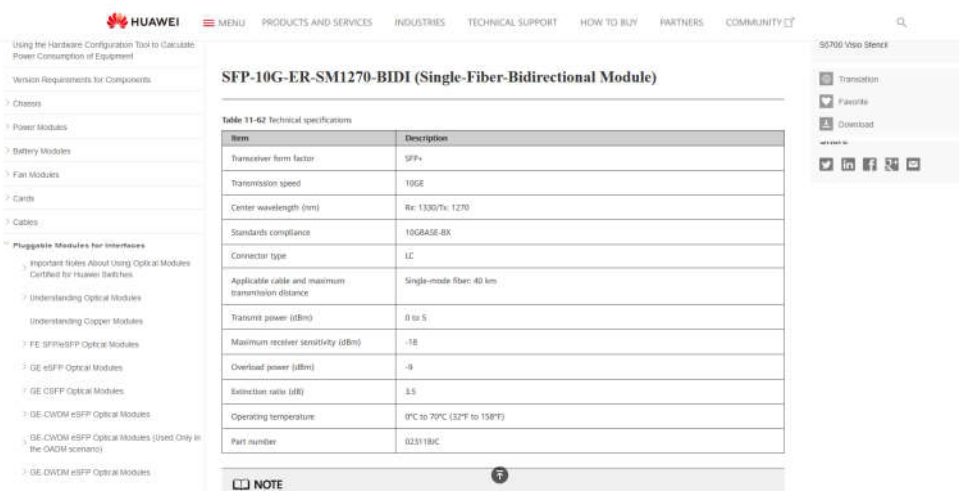


Summary of Key Proposed Changes to 10GBASE-BR40-D/U

PID	Lambda (nm)	Reach (km)	Tx OMA min (dBm)	Stressed Sensitivity (dBm)	Unstressed Sensitivity (dBm)	Ch. Insertion loss (dB)	Power budget (dB)
10GBASE-BR40/+ (802.3cp)	1270/1330	40	-3.4	-20.3	-22.6	18	21.2
Proposed changes	1270/1330	40	0.3	-16.8	-19	18.5	21.1

Huawei





https://support.huawei.com/enterprise/en/doc/EDOC1000019246/96f9d269/sfp-10g-er-sm1330-bidi-single-fiber-bidirectional-module

https://support.huawei.com/enterprise/en/doc/EDOC1000019246/ae1cf6e4/sfp-10g-er-sm1270-bidi-single-fiber-bidirectional-module

Molex

Transmitter Performance Characteristics (Over Operating Case Temperature, V_{CC} =3.13 to 3.47V)

Parameter		Symbol	Min	Typ	Max	Units
Data Rate		*B*	2.5	-	10.7	Gb/s
Center Wavelength	Up Stream	λ_C	1260	1270	1280	nm
	Down Stream		1320	1330	1340	
Spectral Width		$\Delta\lambda_{20}$	-	-	1.0	nm
Average Optical Output Power		P_{avg}	0	-	5	dBm
Optical Modulation Amplitude		P_{OMA}	0	-	-	dBm
Extinction Ratio		*ER*	5.5	-	-	dB
Relative Intensity Noise		*RIN*	-	-	- 128	dB/Hz
Side Mode Suppression Ratio		*SMSR*	30	-	-	dB
Optical Return Loss Tolerance		-	-	-	- 21	dB
Transmitter and Dispersion Penalty		*TDP*	-	-	3.2	dB
Optical Output Eye[1]		Compliant with IEEE 802.3ae				

[1]Average power figures are informative only, per IEEE 802.3ae.

Receiver Performance Characteristics (Over Operating Case Temperature, V_{CC} =3.13 to 3.47V)

Parameter		Symbol	Min	Typ	Max	Units
Data Rate		*B*	2.5	-	10.7	Gb/s
Center Wavelength	Up Stream	λ_C	1320	1330	1340	nm
	Down Stream		1260	1270	1280	
Receiver Sensitivity	Pavg @ 10.3125 Gb/s[1]	P_{min}	- 21.2	-	-	dBm
	OMA @ 10.3125 Gb/s[1]		-19	-	-	
Maximum Input Power (10^{-12} BER)		P_{MAX}	- 9	-	-	dBm
Receiver Reflectance		-	-	-	- 21	dB
LOS Hysteresis		-	0.5	1.5	6	dB
LOS Thresholds	Increasing Light Input	P_{los+}	-	-	- 25	dBm
	Decreasing Light Input	P_{los-}	- 40	-	-	

[1]Specified with BER <$1x10^{-12}$ and PRBS 2^{31}-1. Average receive power is informative..

Note: The specified characteristics are met within the recommended range of operation. Unless otherwise noted typical data are quoted at nominal voltage and +25°C ambient temperature.