

Fiber emulator filter proposal for 1060nm PMD

In support of comment #130 on .3ds Draft 1.1

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Introduction

- The 3 dB bandwidth of the fiber emulator filter used for TDECQ measurement is currently listed as **TBD** in Clause 194
- The fiber emulator filter models the combined effects of chromatic and modal dispersion in the fiber and depends on the laser wavelength, laser spectral width, fiber length, EMB, zero-dispersion wavelength, and dispersion slope.
- All of these parameters are already specified in Draft 1.1, enabling the 3 dB bandwidth to be determined.
- This presentation supports the proposed value in comment #130.

Cl 194	SC 194.9.7	P106	L36	# 130
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Comment Type T		Comment Status X		
3dB bandwidth of the fiber emulator filter is currently TBD				
<i>Suggested Remedy</i>				
Change TBD with 52.6GHz. Contribution justifying the value will be presented				

Table 193–14—The 3 dB bandwidth f_A of the fiber emulation filter for TDECQ measurement

PMD type	Center wavelength (range) (nm)	3 dB bandwidth f_A (GHz)
200GBASE-SR1-30 800GBASE-SR2-30 400GBASE-SR4-30 1.6TBASE-SR8-30	844 – 868	60.7
200GBASE-SR1-50 400GBASE-SR2-50 800GBASE-SR4-50 1.6TBASE-SR8-50	852 – 868	48.2

Table 194–14—The 3 dB bandwidth f_A of the fiber emulation filter for TDECQ measurement

PMD type	Center wavelength (range) (nm)	3 dB bandwidth f_A (GHz)
200GBASE-MR1 800GBASE-MR2 400GBASE-MR4 1.6TBASE-MR8	1052 – 1068	TBD

Clause 193 Fiber Emulator Filter Analysis

Table 193-7—Transmit characteristics

Description	Reference	200GBASE-SR1-30	200GBASE-SR1-50	Unit	
		400GBASE-SR2-30	400GBASE-SR2-50		
		800GBASE-SR4-30	800GBASE-SR4-50		
		1.6TBASE-SR8-30		1.6TBASE-SR8-50	
Signaling rate, each lane (range)	—	106.25 ± 50 ppm		GBd	
Modulation format	—	PAM4		—	
Center wavelength (range)	193.9.4	844 – 868	852 – 868	nm	
RMS spectral width ^a (max)	193.9.4	0.55	0.45	nm	

Table 193-10—Optical channel characteristics

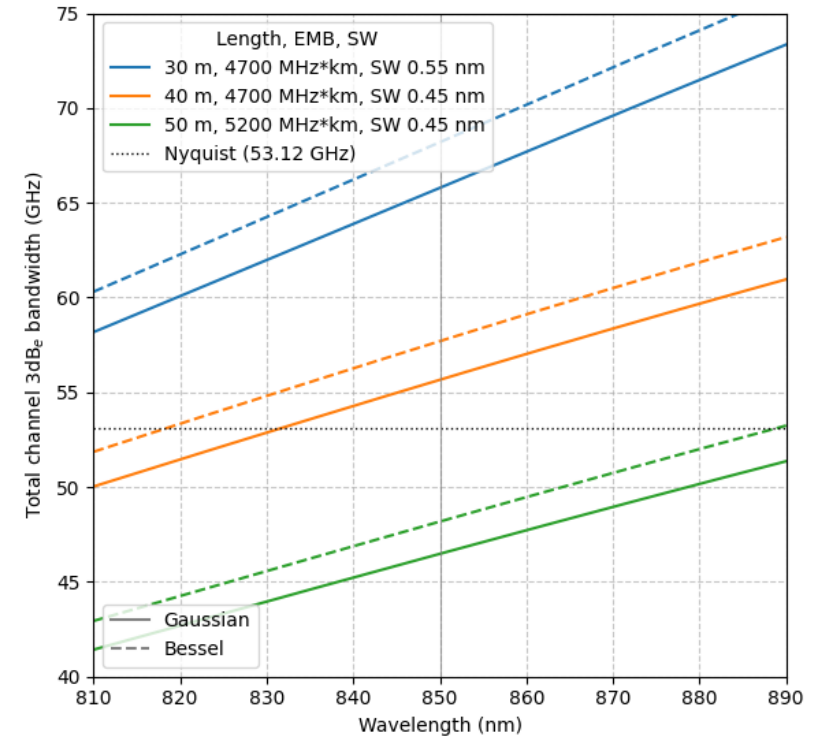
Description	200GBASE-SR1-30				200GBASE-SR1-50				Unit		
	400GBASE-SR2-30				400GBASE-SR2-50						
		800GBASE-SR4-30				800GBASE-SR4-50					
		1.6TBASE-SR8-30				1.6TBASE-SR8-50					
		OM3	OM4	OM5	OMz	OM3	OM4	OM5	OMz		
Operating distance (max)		15	30	30	TBD	20	40	45	50	m	

Table 193-11—Optical fiber and cable characteristics

Description	OM3 ^a	OM4 ^b	OM5 ^c	OMz	Unit
Nominal core diameter	50				μm
Nominal fiber specification wavelength	850		850 and 953		TBD
Effective modal bandwidth at 850 nm (min) ^d	2000		4700		TBD
Effective modal bandwidth at 953 nm (min)	Not specified ^e		2470 ^e		TBD
Effective modal bandwidth at 860 nm (min)	—		—		5200
					MHz · km
					MHz · km
					MHz · km

Table 193-14—The 3 dB bandwidth f_A of the fiber emulation filter for TDECQ measurement

PMD type	Center wavelength (range) (nm)	3 dB bandwidth f_A (GHz)
200GBASE-SR1-30 800GBASE-SR2-30 400GBASE-SR4-30 1.6TBASE-SR8-30	844 – 868	60.7
200GBASE-SR1-50 400GBASE-SR2-50 800GBASE-SR4-50 1.6TBASE-SR8-50	852 – 868	48.2



Total channel 3dB_e bandwidth vs wavelength for 850 nm VCSELs at 106.25 GBd

Fiber emulator filter 3dB BW at 850nm:

SR-30 (spectral width = 0.55 nm):

30m OM4, 4700 MHz*km -> Gaussian: 65.76 GHz, Bessel: 68.17 GHz

SR-50 (spectral width = 0.45 nm):

40 m OM4, 4700 MHz*km -> Gaussian: 55.63 GHz, Bessel: 57.67 GHz

50 m OMz, 5200 MHz*km -> Gaussian: 46.45 GHz, Bessel: 48.15 GHz

Clause 194 Fiber Emulator Filter Analysis

Table 194-7—Transmit characteristics

Description	Reference	200GBASE-MR1 400GBASE-MR2 800GBASE-MR4 1.6TBASE-MR8	Unit
Signaling rate, each lane (range)	—	106.25 ± 50 ppm	GBd
Modulation format	—	PAM4	—
Center wavelength (range)	194.9.4	1052 – 1068	nm

Table 194-10—Optical channel characteristics

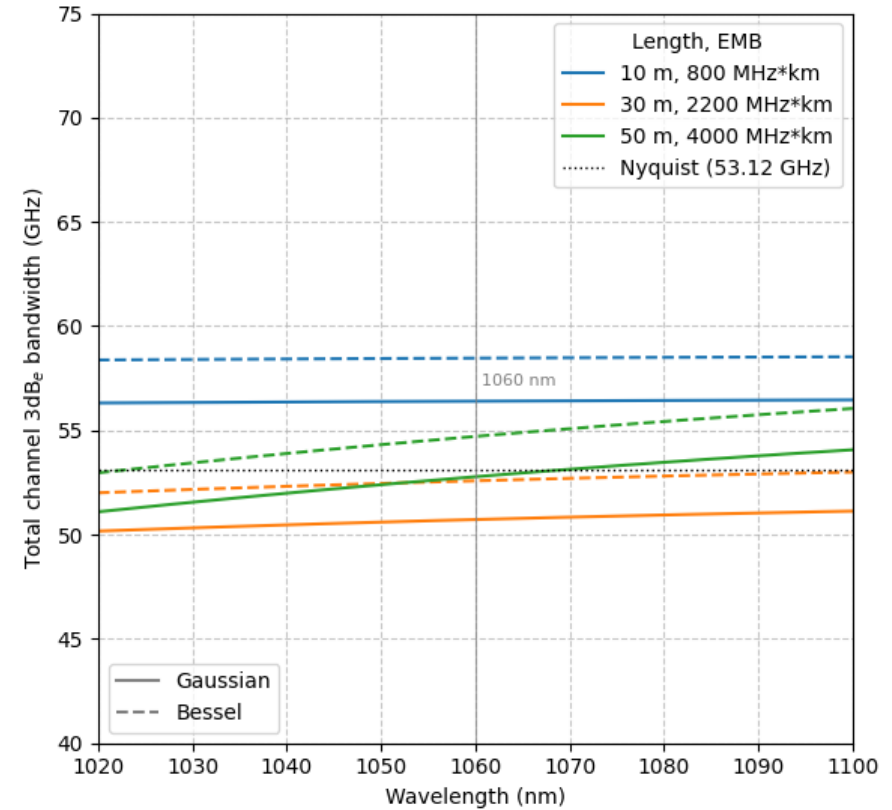
Description	200GBASE-MR1 400GBASE-MR2 800GBASE-MR4 1.6TBASE-MR8			Unit
	L1060_800	L1060_2200	L1060_4000	
Operating distance (max)	10	30	50	m

Table 194-11—Optical fiber and cable characteristics

Description	L1060_800	L1060_2200	L1060_4000	Unit
Nominal core diameter	TBD			μm
Nominal fiber specification wavelength	1060			nm
Effective modal bandwidth at 850 nm (min) ^a	800	2200	4000	MHz · km

Table 194-14—The 3 dB bandwidth f_A of the fiber emulation filter for TDECQ measurement

PMD type	Center wavelength (range) (nm)	3 dB bandwidth f_A (GHz)
200GBASE-MR1 800GBASE-MR2 400GBASE-MR4 1.6TBASE-MR8	1052 – 1068	TBD 52.6GHz



Total channel 3dB_e bandwidth vs wavelength at 106.25 GBd with a spectral width of 0.50 nm

Total channel 3dB_e bandwidth at 1060 nm (spectral width = 0.50 nm):
 10 m, 800 MHz*km -> Gaussian: 56.40 GHz | Bessel: 58.47 GHz
 30 m, 2200 MHz*km -> Gaussian: 50.72 GHz | **Bessel: 52.58 GHz**
 50 m, 4000 MHz*km -> Gaussian: 52.77 GHz | Bessel: 54.70 GHz

Conclusion

- Replace the TBD value for the 3 dB bandwidth of the fiber emulator filter used for TDECQ measurement in Table 194-14 with **52.6 GHz**.