Revised Baseline Proposal for 400GPL Single Wavelength Objectives

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Applicable Objectives

- **400 Gb/s Related** (400GBASE-DR1)
  - Define a physical layer specification that supports 400 Gb/s operation over 1 pair of SMF with lengths up to at least 500 m
- **800 Gb/s Related** (800GBASE-DR2)
  - Define a physical layer specification that supports 800 Gb/s operation over 2 pairs of SMF with lengths up to at least 500 m
- **1.6 Tb/s Related** (1.6TBASE-DR4)
  - Define a physical layer specification that supports 1.6 Tb/s operation over 4 pairs of SMF with lengths up to at least 500 m

Detailed Optical Transmitter Specifications

Description	**400GBASE-DR1** **800GBASE-DR2** **1.6TBASE-DR4**	**Unit**
Signaling rate, each lane (range)	212.5 ± 50 ppm	GBd
Modulation Format	PAM4	
Lane wavelengths (range)	1304.5 to 1317.5	nm
Side-mode suppression ratio (SMSR), (min)	30	dB
Average launch power, each lane (max)	5.5	dBm
Average launch power, each lane (min)	-1.6	dBm
Outer Optical Modulation Amplitude (OMAouter), each lane (max)	5.7	dBm
Outer Optical Modulation Amplitude (OMAouter), each lane(min) for MAX(TECQ,TQM) < 0.9 dB for 0.9 dB ≤ MAX(TECQ,TQM†) ≤ 3.75 dB	 1.4 0.5 + MAX(TECQ, TQM)	 dBm dBm
Transmitter quality metric (TQM), each lane (max)	3.75	dB
TECQ (max)	3.75	dB
|TQM – TECQ|, each lane (max)	2.5	dB
Average launch power of OFF transmitter, each lane (max)	-15	dBm
Transmitter functional symbol error histogram, each lane (max)	TBD	
Extinction ratio, each lane, (min)	3	dB
Transmitter transition time (max)	6	ps
Transmitter over/under-shoot (max)	27	%
RINxOMA (max)	-142	dB/Hz
Optical return loss tolerance (max)	21.4 (15.5 for 400GBase-DR1)	dB
Transmitter reflectance (max)	-26	dB

† TQM is a transmitter quality metric test to be defined later

Detailed Optical Receiver Specifications

Description	**400GBASE-DR1** **800GBASE-DR2** **1.6TBASE-DR4**	**Unit**
Signaling rate, each lane (range)	212.5 ± 50 ppm	GBd
Modulation Format	PAM4	
Lane wavelengths (range)	1304.5 to 1317.5	nm
Damage threshold, each lane	6.5	dBm
Average receive power, each lane (max)	5.5	dBm
Average receive power, each lane (min)	-4.6	dBm
Receive power, each lane (OMAouter) (max)	5.7	dBm
Receiver reflectance (max)	-26	dB
Receiver sensitivity (OMAouter), each lane (max) for TECQ < 0.9 dB for 0.9 dB ≤ TECQ ≤ SECQ	 -1.9 -2.8 + TECQ	 dBm dBm
Stressed receiver sensitivity (OMAouter), each lane (max)	0.95	dBm
Conditions of stressed receiver sensitivity test: SECQ OMAouter of each aggressor lane	 3.75 5.7	 dB dBm

Comparison of Illustrative Power Budget

Description	**200GBASE-DR1** **400GBASE-DR2** **800GBASE-DR4**	**400GBASE-DR1** **800GBASE-DR2** **1.6TBASE-DR4**	**Unit**
Power budget (for max TQM)	6.7	7.05	dB
Operating distance	500	500	m
TECQ/TQM (max)	3.4	3.75	dB
Channel insertion loss	3	3	dB
Maximum discrete reflectance	-35	-35	dB
Allocation for penalties (for max TQM) - includes 0.3 dB MPI/DGD allocation	3.7	4.05	dB
Additional insertion loss allowed	0	0	dB

TECQ/SECQ/TQM Reference Equalizer

Parameter	Symbol	Value	
		Minimum	Maximum
Number of feed-forward taps	N_w	22	
Number of pre-cursor feed-forward taps	_	0	5
Main tap coefficient limit	w(0)	0.8	2.5
Normalized feed-forward tap coefficient limits: *i* ≤ -3 *i* = -2 *i* = -1 *i* = 1 *i* = 2 *i* = 3 *i* = 4 *i* = 5 *i* = 6 *i* ≥ 7	w(i)/w(0)	 -0.15 -0.1 -0.5 -0.6 -0.2 -0.15 -0.15 -0.15 -0.15 -0.1	 0.1 0.25 0.1 0.2 0.3 0.15 0.15 0.15 0.15 0.1
Pre-post-cursor tap coefficient difference limit: |w(1)/w(0)-b(1)-w(-1)/w(0)|		-	0.25
Feed-forward tap DC gain		1	
Number of feedback taps		1	
Feedback tap coefficient limit		0	0.7

Backup