

Optical Parameters – Baseline Proposal Status

Tom Issenhuth,
John D'Ambrosia

Status of Optical Parameters Baseline

- This presentation is not intended for debate of the parameters or values but to capture the current state of the baseline proposal
 - Prior baseline summary issenhuth_3cw_01_200611
- The key progression of the baseline:
 - Initial proposal and adoption of parameters (excluding values)
 - Stassar_3ct_02_0719 via Vienna motion 5
 - Reaffirmed via motion 4 from April 2, 2020 interim teleconference
 - Proposed update to parameters, no adoption: stassar_3cw_01_200423
 - Proposed update and adoption of some parameters and values : sluyski_3cw_02_200507
 - Motion #1 from 5/7 TF Interim Teleconference: Adopt updating the parameter list on slides 4 to 6 of stassar_3ct_02_0719 with the parameter list and values specified on slides 11 – 14 of sluyski_3cw_02_200507
 - Proposed update to generic list of parameters for both 100GBASE-ZR and 400GBASE-ZR in stassar_3cw_01_200611
 - Adopted via motion #1 on August 13 during interim teleconference
 - Current status of optical parameters in the current draft
 - Parameter names from stassar_3cw_01_200611 with noted modifications
 - Parameter values from sluyski_3cw_02_200507
 - The names of common parameters between .3ct and .3cw have been aligned per P802.3ct D2.1

Updated Baseline – 400GBASE-ZR Transmit Characteristics

Table 156–8—400GBASE-ZR transmit characteristics

Description	Value	Unit
Signaling rate (range)	59.84375 +/- 20ppm	GBd
Modulation format	DP-16QAM	—
Minimum channel spacing	75	GHz
Average channel output power (max)	−6	dBm
Average channel output power (min)	−10	dBm
Nominal center frequency	The frequency in Table 156–6 corresponding to the variable Tx_optical_channel_index	THz
Spectral excursion (max)	TBD	GHz
Side-mode suppression ratio (SMSR), (min)	TBD	dB
Laser linewidth (max)	500	kHz
Offset between the carrier and the nominal center frequency (max)	1.8	GHz
Power difference between X-Y polarizations (max)	1.5	dB
Skew between X-Y polarizations (max)	5	ps
Error vector magnitude (max)	TBD	%
I-Q offset (max)	TBD	dB
Transmitter Inband OSNR(193.6) (min)	34	dB (0.1nm)
Average launch power of OFF transmitter (max)	−20	dBm
Optical return loss tolerance ^a (max)	−24	dBm
Transmitter reflectance ^b (max)	−20	dB

^aMaximum light power (relative in decibel w.r.t Tx output) reflected back to transmitter while still meeting performance requirements.

^bTransmitter reflectance is defined looking into the transmitter.

- Other items proposed for further study
 - Spectra excursion (min)
 - Laser relative intensity noise (avg)
 - Laser relative intensity noise (max)
 - Instantaneous I/Q offset (Dither)
 - Tx Clock Phase Noise
 - Transmitter back reflectance tolerance

Updated Baseline – 400GBASE-ZR Receive Characteristics

Table 156–9—400GBASE-ZR receive characteristics

Description	Value	Unit
Signaling rate (range)	59.84375 +/- 20ppm	GBd
Modulation format	DP-16QAM	—
Nominal center frequency	The frequency in Table 156–6 corresponding to the variable Rx_optical_channel_index	THz
Damage threshold ^a		
Average receive power (max)	0	dBm
Average receive power [amplified] (min)	–12	dBm
Average receive power [unamplified] ^b (min)	TBD	dBm
Receiver OSNR(193.6) [amplified] (min)	TBD	dB (0.1 nm)
Receiver OSNR(193.6) [unamplified] ^b (min)	TBD	dB (0.1 nm)
Receiver OSNR tolerance(193.6)	26	dB (0.1 nm)
Receiver reflectance (max)	20	dB

^aThe receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level. The receiver does not have to operate correctly at this input power.

^bThis parameter is not necessary to support amplified DWDM links up to at least 80 km of single-mode fiber, but has been added to allow operation on unamplified links.

- Other items proposed for further study
 - Damage Threshold
 - PMD Tolerance
- Changes from stassar_3cw_01_200611
 - “Average receive power [amplified] max” changed to “Average receive power [amplified] min” per correction noted in adopting motion

Updated Baseline – 400GBASE-ZR Black Link Characteristics

Table 156–10—400GBASE-ZR black link characteristics

Description	Value	Unit
Channel spacing (min)	75	GHz
Ripple (max)	TBD	dB
Optical path OSNR penalty (max)	TBD	dB
Chromatic dispersion (max)	2000	ps/nm
Chromatic dispersion (min)	0	ps/nm
Fiber chromatic dispersion slope at channel center frequencies ^a (min)	TBD	ps/nm ² km

Description	Value	Unit
Optical return loss at TP2 (min)	24	dB
Differential group delay, (DGD) ^b (max)	28	ps
Polarization dependent loss (max)	2.0	dB
Polarization rotation speed (max)	50	krad/s
Inter-channel crosstalk at TP3 (max)	TBD	dB
Interferometric crosstalk at TP3 (max)	TBD	dB

^aThe applicable channel center frequencies are specified in Table 156–6.

^bDifferential 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 must tolerate.

- Other items proposed for further study
 - Black link transfer function with a well defined TX spectrum
- Changes from stassar_3cw_01_200611
 - “Fiber dispersion slope (S0) (min)” changed to “Fiber chromatic dispersion slope at channel center frequencies (min)” to keep alignment with 802.3ct where parameter name was changed in D2.0 comment #109.
 - “Differential group delay, DGD_max (max)” changed to “Differential group delay, DGD (max)” to remove double “max”.

Thanks!