

Clause 95 TBCs and TBDs

jonathan king

30th May 2013

Table 95-6—100GBASE-SR4 transmit characteristics

Description	Value	Unit
Signaling rate, each lane (range)	25.78125 ± 100 ppm	GBd
Lane wavelength (range)	840 to 860	nm
RMS spectral width ^a	0.6	nm
Average launch power, each lane (max)	2.4	dBm
Average launch power, each lane ^b (min)	-9.1 TBC	dBm
Optical Modulation Amplitude (OMA), each lane (max)	3	dBm
Optical Modulation Amplitude (OMA), each lane (min)	-7.1 TBC	dBm
Launch power in OMA minus TDP (min)	-8 TBC	dBm
Transmitter and dispersion penalty (TDP), each lane (max)	5 TBC	dB
Difference in launch power between any two lanes (max)	TBD (4 or greater)	dB
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}	TBD	

- TDP
- Difference in launch power between lanes
- Transmitter eye mask

Table 95-7—100GBASE-SR4 receive characteristics

Description	Value	Unit
Signaling rate, each lane (range)	25.78125 ± 100 ppm	GBd
Lane wavelengths (range)	840 to 860	nm
Damage threshold ^a (min)	3.4	dBm
Average receive power, each lane (max)	2.4	dBm
Average receive power, each lane ^b (min)	-11 TBC	dBm
Receive power, each lane (OMA) (max)	3	dBm
Receiver reflectance (max)	-12	dB
Stressed receiver sensitivity (OMA), each lane ^c (max)	TBD	dBm
Conditions of stressed receiver sensitivity test:		
Vertical eye closure penalty, ^d each lane	TBD	dB
Stressed eye jitter, ^d each lane	TBD	UI

TDP

- SRS value and test definition

Table 95–8—100GBASE-SR4 illustrative link power budget

Parameter	OM3	OM4	Unit
Effective modal bandwidth at 850 nm ^a	2000	4700	MHz.km
Power budget (for max TDP)	8.2 TBC		dB
Operating distance	0.5 to 70	0.5 to 100	m
Channel insertion loss ^b	1.8	1.9	dB
Allocation for penalties ^c (for max TDP)	5 TBC	5 TBC	dB
Additional insertion loss allowed	0.1	0	dB

- TDP dependents

Table 95–12—Fiber optic cabling (channel) characteristics for 100GBASE-SR4

Description	OM3	OM4	Unit
Operating distance (max)	70	100	m
Cabling Skew (max)	79		ns
Cabling Skew Variation ^a (max)	2.5		ns
Channel insertion loss ^b (max)	1.8	1.9	dB
Channel insertion loss (min)	0		dB

^aAn additional 300 ps of Skew Variation could be caused by wavelength changes, which are attributable to the transmitter not the channel.

^bThese channel insertion loss values include cable loss plus 1.5 dB allocated for connection and splice loss, over the wavelength range 840 nm to 860 nm.

- Skew Variation due to cable needs to be recalculated for the 100m OM4, 70m OM3
 - 300ps was from clause 86, for 150m OM4

Table 95–10—Test-pattern definitions and related subclauses

Parameter	Pattern	Related subclause
Wavelength	3, 5 or valid 100GBASE-R signal	95.8.2
Average optical power	3, 5 or valid 100GBASE-R signal	95.8.3
Optical modulation amplitude (OMA)	Square wave or 4	95.8.4
Transmitter and dispersion penalty (TDP)	3 or 5	95.8.5
Extinction ratio	3, 5 or valid 100GBASE-R signal	95.8.6
Transmitter optical waveform	3, 5 or valid 100GBASE-R signal	95.8.7
Stressed receiver sensitivity	3 or 5	95.8.8
Calibration of OMA for receiver tests	Square wave or 4	TBD
Vertical eye closure penalty calibration	3 or 5	TBD

- SRS test definition dependent (references to the section numbers where these patterns are used)

TDP test

95.8.5 Transmitter and dispersion penalty (TDP)

Transmitter and dispersion penalty (TDP) shall be as defined in TBD with the following exceptions:

- a) Each optical lane is tested individually with all other lanes in operation.
- b) The test pattern is as defined in Table 95–10
- c) The transmitter is tested using an optical channel with an optical return loss of 12 dB.
- d) The reference receiver (including the effect of the decision circuit) has a fourth-order Bessel-Thomson filter response with a bandwidth of TBD Hz. The transversal filter of 52.9.10.3 is not used.
- e) The clock recovery unit (CRU) used in the TDP measurement has a corner frequency of 10 MHz and a slope of 20 dB/decade.
- f) The reference sensitivity S and the measurement P_{DUT} are both measured with the sampling instant displaced from the eye center by ± 0.15 UI. For each of the two cases (early and late), if $P_{DUT}(i)$ is larger than $S(i)$, the $TDP(i)$ for the transmitter under test is the difference between $P_{DUT}(i)$ and $S(i)$, $TDP(i) = P_{DUT}(i) - S(i)$. Otherwise, $TDP(i) = 0$. The TDP is the larger of the two $TDP(i)$.
- g) The test setup illustrated in Figure 52-12 shows the reference method. Other measurement implementations may be used with suitable calibration.
- h) TDP is defined for each lane, at the BER specified in Table 95.1.1 and is for the lane under test on its own. See 95.8.1.1 for multi-lane pattern considerations.

- Proposal: TDP test should reference the description in clause 52, with appropriate exceptions (similar to approach in clause 86, 802.3 ba)

SRS test

95.8.8 Stressed receiver sensitivity

Stressed receiver sensitivity shall be within the limits given in Table 95–7 if measured using the method defined in TBD with the following exceptions:

- a) Added sinusoidal jitter is as specified in Table 95–11.
- b) The stressed eye jitter and vertical eye closure penalty are as given in Table 95–7.
- c) The test pattern is as given in Table 95–10.
- d) The reference receiver used to verify the conformance test signal is required to have the bandwidth given in 95.8.7.

Table 95–11—Applied sinusoidal jitter

Frequency range	Sinusoidal jitter, peak-to-peak (UI)
$f < 100 \text{ kHz}$	Not specified
$100 \text{ kHz} < f \leq 10 \text{ MHz}$	$5 \times 10^5 / f$
$10 \text{ MHz} < f < 10 LB^a$	0.05

^a LB = loop bandwidth; upper frequency bound for added sine jitter should be at least 10 times the loop bandwidth of the receiver being tested.

- Proposal: SRS test should reference the description in clause 52, with appropriate exceptions (similar to approach in clause 86, 802.3 ba)

Summary

- TDP and test
- SRS and test
- Skew variation for 100m OM4
- Difference in launch power between lanes
- Transmitter eye mask