

Comments #251 and #254: Stressed Receiver Sensitivity Tests

Hamid Rategh, Atul Gupta, Francis Ho : Inphi Corporation
Andre Szczepanek : HSZ Consulting Ltd/Inphi Corporation

IEEE P802.3ba, San Francisco, July 2009

Comment #251: Sinusoidal Amplitude Interference

In 88.9.10, the mix of references to Clauses 52 & 53 make the status of sinusoidal amplitude interference unclear:

88.9.10 Stressed receiver sensitivity

Stressed receiver sensitivity shall be within the limits given in Table 88–8 for 100GBASE–LR4 or Table 88–12 for 100GBASE–ER4 if measured using the method defined in 53.9.12 and 53.9.15 with the conformance test signal at TP3 as described in 53.9.14 with the following exceptions:

Table 88–17—Applied sinusoidal jitter

Frequency range	Sinusoidal jitter ($UI_{pk\ to\ pk}$)
$f < 100\text{ kHz}$	Not specified
$100\text{ kHz} < f \leq 10\text{ MHz}$	$2 \times 10^5 / f + S - 0.05^a$
$10\text{ MHz} < f < 10\text{ LB}^b$	$0.05 \leq S \leq 0.15^a$

^a S is the magnitude of sine jitter actually used in the calibration of the stressed eye per the methods of 52.9.9.3.

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

Status of Sinusoidal Amplitude Interference

- Clause 52 had both sinusoidal amplitude interference AND sinusoidal jitter.
- Clause 53 only has sinusoidal jitter.
- Can it be assumed that there is NO sinusoidal amplitude interference because there is no reference to sinusoidal amplitude interference in 53.9.12/14/15?
 - Although 52.9.9 does refer to sinusoidal amplitude interference, that section is not mentioned in 88.9.10.
 - Although Table 88-17 does refer to 52.9.9.3, it does so in the context of sinusoidal jitter, and not sinusoidal amplitude interference.
 - What are the fundamental reasons for requiring the sinusoidal amplitude interference at 10G which do not apply to 25G serial?

Comment #251: Suggested Remedy

- In the 88.9.10 exceptions list, explicitly state either
 1. sinusoidal amplitude interference (per 52.9.9) is required; or
 2. sinusoidal amplitude interference (per 52.9.9) is not required

Comment #254: DCD DJ

In 88.9.10, the reference to 53.9.14 specifies too much DCD DJ because LX4 defines DCD DJ in ps, not fractions of a UI.

53.9.14 Conformance test signal at TP3 for receiver testing

*Receivers being tested for conformance to the stressed receive sensitivity requirements of 53.9.9 and the total jitter requirements of 53.9.10 shall be tested using a conformance test signal at TP3 conforming to the requirements described in Figure 53–12. It is recommended that the conformance test signal be generated using a short continuous random test pattern as defined in Annex 48A. The conformance test signal is conditioned by applying deterministic jitter (DJ) and intersymbol interference (ISI). The conditioned conformance test signal is shown schematically in Figure 53–12. **The horizontal eye closure (reduction of pulse width) caused by the duty cycle distortion (DCD) component of DJ shall be no less than 14 ps.***

- The serial rate of LX4 is 3.125 Gb/s, so 14ps = 0.04375 UI
- Using the same fractional UI at 25.78125 Gb/s (UI=38.7878 ps), the minimum DCD DJ should be 1.6969, rounded to 1.7 ps.
- **Add another exception (e) to 88.9.10 with DCD DJ of 1.7 ps.**