6G SAS
RX Tolerance, Reference RX & Reference TX

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Jitter Tolerance Table

Modify note k to something like:

"For 6 Gbps, TJ is measured at the reference RX output, then disconnected and connected to the RX under test"

Table 60 — Receiver device jitter tolerance at receiver device compliance points IR and CR
Mike Jenkins to update for 6 Gbps

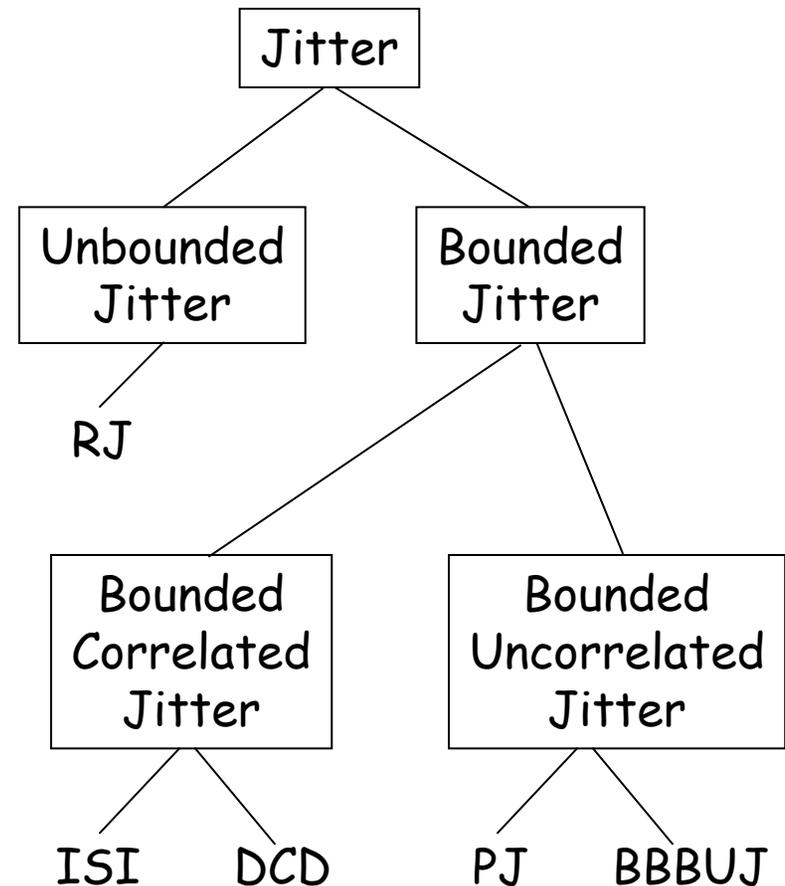| Signal Characteristic	Units	IR			CR		
		1,5 Gbps	3,0 Gbps	6,0 Gbps	1,5 Gbps	3,0 Gbps	6,0 Gbps
Applied sinusoidal jitter (SJ) [b]	UI	0,10 [c]	0,10 [d]	0,10 [i]	0,10 [c]	0,10 [d]	0,10 [i]
Deterministic jitter (DJ) [a, h]	UI	0,35 [f]	0,35 [g]	0,35 [j]	0,35 [f]	0,35 [g]	0,35 [j]
Total jitter (TJ) [a, e, h, k]	UI	0,65					

a   All DJ and TJ values are level 1 (see MJSQ).
b   The jitter values given are normative for a combination of applied SJ, DJ, and TJ that receiver devices shall be able to tolerate without exceeding the required BER (see 5.3.3). Receiver devices shall tolerate applied SJ of progressively greater amplitude at lower frequencies, according to figure 116 (see 5.3.5.4), with the same DJ and RJ levels as were used in the high frequency sweep.
c   Applied sinusoidal swept frequency: 900 kHz to the minimum of 5 MHz and (3,75 x 2(generation - 1) MHz) (e.g., 5 MHz for 1,5 Gbps and 7,5 MHz for 3 Gbps).
d   Applied sinusoidal swept frequency: 1 800 kHz to the minimum of 5 MHz and (3,75 x 2(generation - 1) MHz) (e.g., 5 MHz for 1,5 Gbps and 7,5 MHz for 3 Gbps).
e   No value is given for RJ. For compliance with this standard, the actual RJ amplitude shall be the value that brings TJ to the stated value at a probability of 10^{-12}. The additional 0,1 UI of applied SJ is added to ensure the receiver device has sufficient operating margin in the presence of external interference.
f   The measurement bandwidth shall be 900 kHz to 750 MHz.
g   The measurement bandwidth shall be 1 800 kHz to 1 500 MHz.
h   The DJ and TJ values in this table apply to jitter measured as described in 5.3.5.3. Values for DJ and TJ shall be calculated from the CDF for the jitter population using the calculation of level 1 jitter compliance levels method in MJSQ.
i   Applied sinusoidal swept frequency: 3 600 kHz to 15 MHz.
j   The measurement bandwidth shall be 3 600 kHz to 3 000 MHz.
k   TJ for 6 Gbps is after equalization and not at the compliance point.

Open Issues

- Add CDR function to Reference RX?
- Which impairments (and how much) to include in jitter tolerance?
  - Bounded uncorrelated jitter (BUJ)
    - DJ = BUJ + ISI from ref. channel
  - NEXT & FEXT
  - Sinusoidal jitter (SJ)
 - Req'd RX (post-EQ) eye opening vs. TX amplitude

Jitter Taxonomy

- ## Unbounded Jitter (identical to RJ)

- ## Bounded Jitter

  - Bounded Uncorrelated Jitter (BUJ) (this by definition includes periodic jitter (PJ))

  - Bounded Correlated Jitter (this includes ISI (=DDJ) and DCD)

```
                    Jitter
                   /      \
          Unbounded        Bounded
            Jitter          Jitter
              |            /        \
             RJ    Bounded          Bounded
                   Correlated       Uncorrelated
                   Jitter           Jitter
                   /     \          /      \
                 ISI     DCD      PJ      BBBUJ
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Req'd RX (post-EQ) Eye Opening

- Eye virtually closed by present impairments
  (but see following slide)

- With RJ=DJ=0.10 UI, eye opens as shown →
  - Note vertical opening ~1/3rd of typical spec

- Need for voltage amplitude to provide RX noise margin
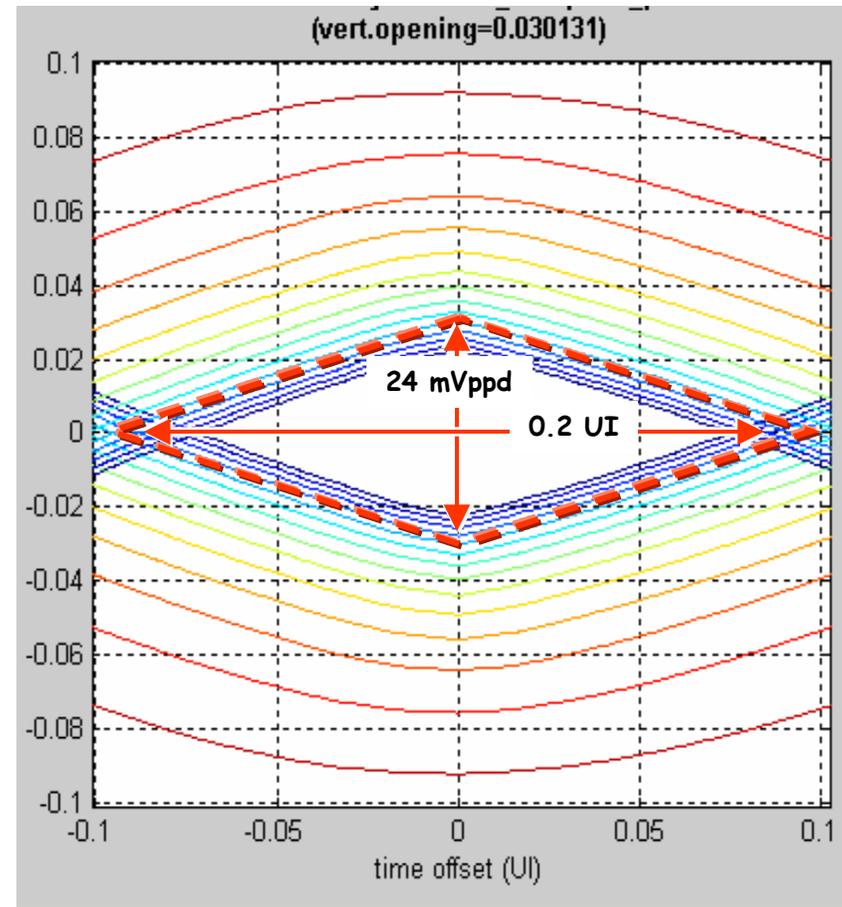
Eye Penalty: 8B10B vs. Random

For 10m cable, skin effect causes rapid change in attenuation at low frequencies.

This causes significant eye closure for data with long run lengths
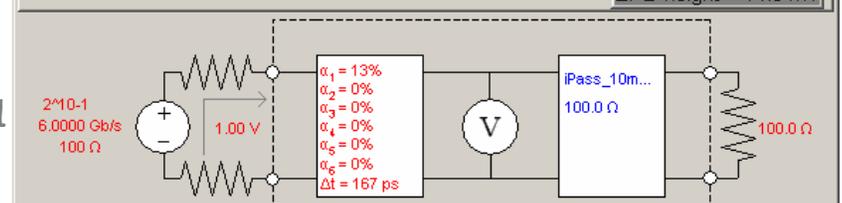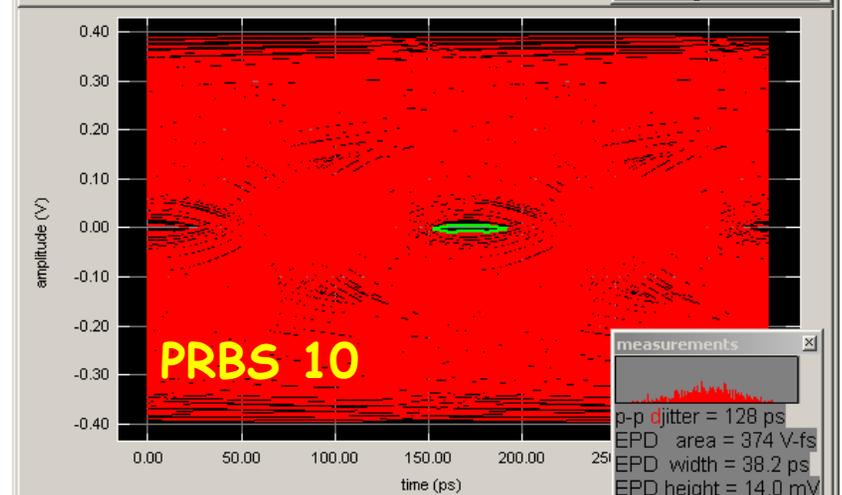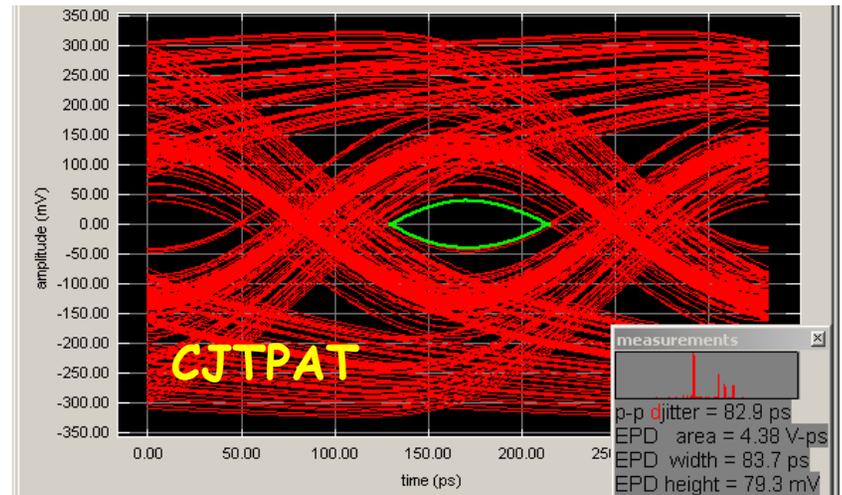
Proposals & Interpretations

- DJ (including SJ) added at TX is BUJ
- Effect of NEXT & FEXT included in BUJ
- TJ at ref RX output is "noncompensable jitter"
- Increase VMA of ref TX to 800 mVppd to provide more than trivial vertical eye opening at ref RX output
- Need to wait for rev 5 Stateye (with 8B10B) to close budget on Reference TX & RX parameters