In Support of Comments on D3.0

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IEEE Interim Meeting

LRM / ae Stress Receiver Test

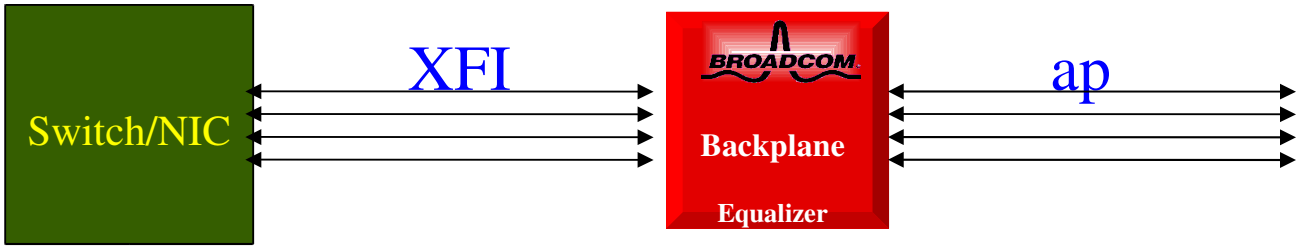
- **Test the receiver with a set of 3 stressor without any of the transmitter credited low frequency jitter.**

- **In a separate test without the fibre stressor the receiver is tested with the following sinusoidal jitter**
  - ⇨40 KHz with 5 UI and 200 KHz with 1 UI

- **Many standards including 802.3ae and FC use MJS jitter methodology:**
  - ⇨MJS, gives credit to the transmitter for the low frequency jitter as some times it is very difficult to eliminate low frequency jitter from the transmitter.
  - ⇨The receiver with sufficient loop BW can track the low frequency jitter.
  - ⇨But then the receiver and channel must be tested at least with the credit low frequency jitter plus some margin.

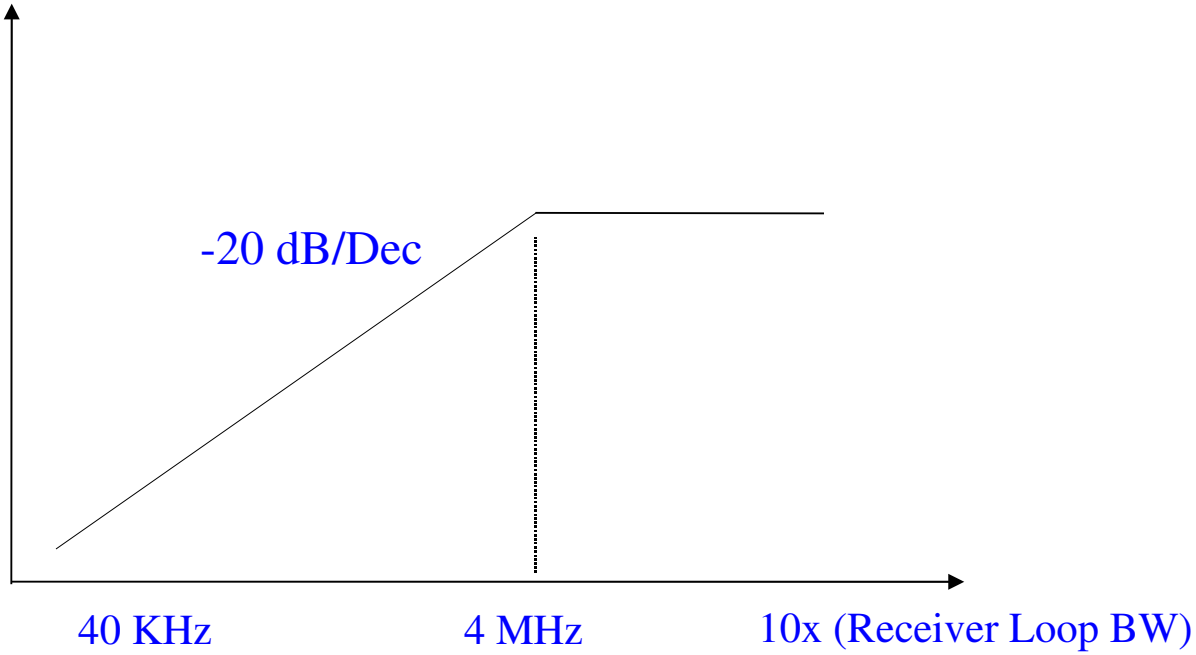
Comment # 230

- **Some backplane application my implement XFI-ap PHY and the current max delay of 512 bits may be too shor.**
  - ⇨512 bits is too short for the PHY in such a implementation
  - ⇨This implementation overall latency may be shorter cases with XAUI PCS as this layer is eliminated.
  - ⇨Propose to increase the latency to 1024 bits
  - ⇨Another option is to define wire to MAC latency



Comment 261 Statement of the Problem

- **ap transmitter is tested with 4MHz CRU "high pass filter"**
  - ⇨Jitter content < 4 MHz will be track with -20 dB /dec slope.
  - ⇨DC-DC converter jitter and side-band will be tracked by the CRU and not captured by the measurement equipment at TP1.
  - ⇨The above jitter sources are present in real operating systems.



Comment 261 Cont.

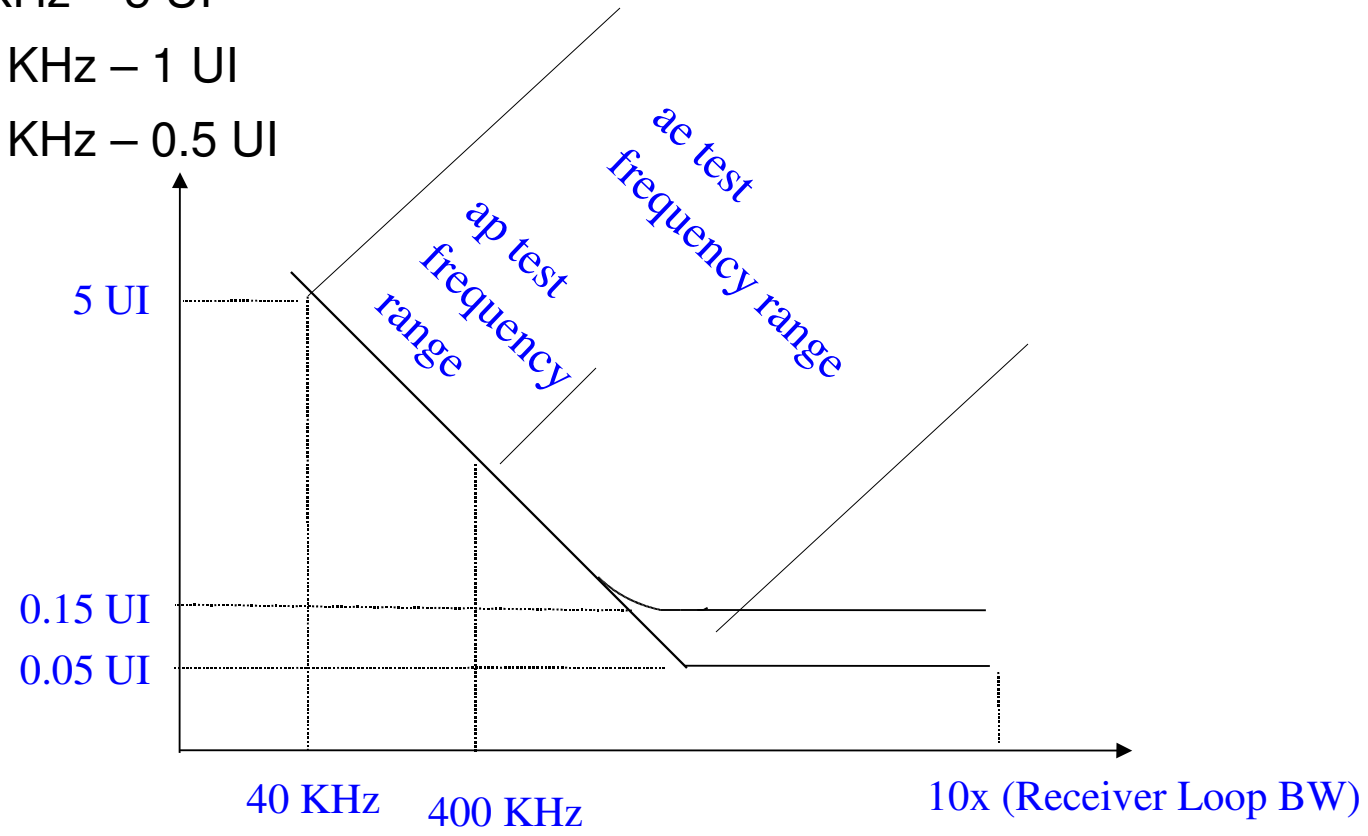
- **In ae link the transmitter is tested with 4 MHz CRU given credit for low frequency jitter, but the real transmitter still transmit these low frequency jitter.**
  - ⇨The current ap receiver not tested with the same jitter!
  - ⇨This can is a major interoperability!
- **DFE based receiver adaptation loop may not track significant amount of sinusoidal jitter at frequency > 500 MHz**
  - ⇨An ae receiver can operate with 0.5 UI at 400 KHz and 0.25 UI SJ at 800 MHz with the stressor present
- **Propose transmitter be tested with 800 KHz CRU**

Comment 260

- ap transmitter are tested with 4 MHz CRU effectively hiding the low frequency SJ.
- SJ frequency faster than the DFE tracking loop has the same decremental effect as the DCD.
- Since DFE receiver may not be able to handle jitter frequency as high 4 MHz, propose to test the receiver with frequency up to 400 KHz.

Proposed Jitter Tolerance

- **Propose to test the ap receiver with following jitter tolerance amplitude and frequency**
  - 40 KHz – 5 UI
  - 200 KHz – 1 UI
  - 400 KHz – 0.5 UI



Comment 262 Statement of Problem

- **Current ap standard defines**
  - ⇨Normative transmitter – TP1 – Output
  - ⇨Channel informative – TP1 to TP4 – Output of channel
  - ⇨Receiver normative – TP4 – Input of receiver
- **No test method provided to determine TP4 output compliance**
  - ⇨IEEE standard specify independent receiver and transmitter compliance
  - ⇨With ap only defining a set of informative channel it is imperative to define TP4 output compliance
  - ⇨If the only compliances method is the end to end BER then there is no reason for ap to cover electrical specification for KR, these material can become informative.

Proposed Compliance Test Method for KR TP4 Output

- **Based on LRM TWDP with the channel impairment set to [0100].**
  - ⇨Code is available in the latest draft of IEEE 802.aq
  - ⇨TWDP or dWDP [impairment set to zero] uses a PRBS2n9 pattern then captured by a sampling scope
    - Other patterns or longer pattern can be used instead
  - ⇨The measured data resynchronized to the reference clock
  - ⇨The data passed through Malab 14 T/2 FFE with 5 T DFE for LRM
  - ⇨TWDP and dWDP measurement are preformed on real channel in time domain and may contain nonlinear element

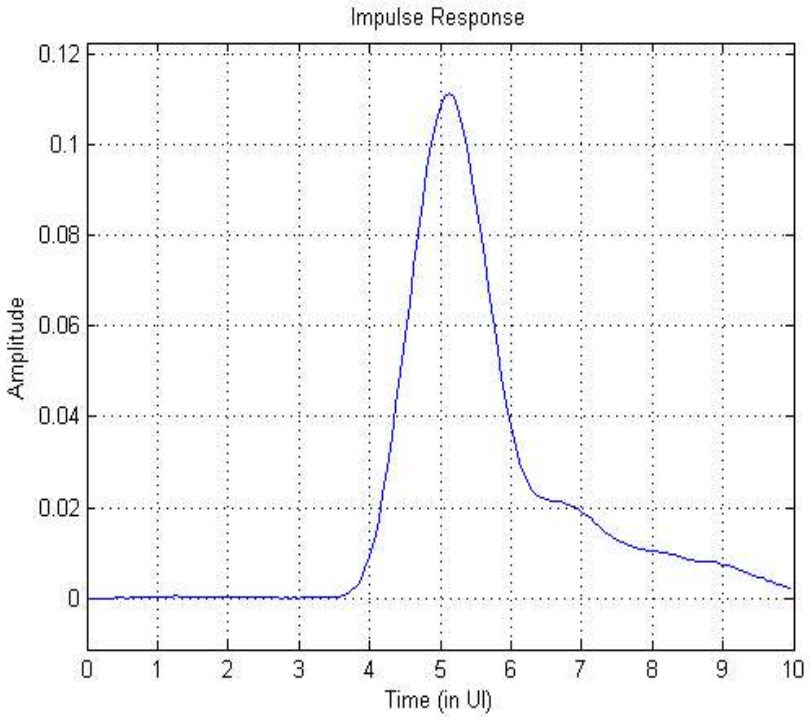
- **With the basic code available, in use widely, and Scope manufacture integrating it in to the scope**
  - ⇨The group just need to agree on the reference receiver FFE/DFE tap.

dWDP Output Results

- **Transmitter operating at 10.3125 Gb/s driving the channel with PRBS2n9**

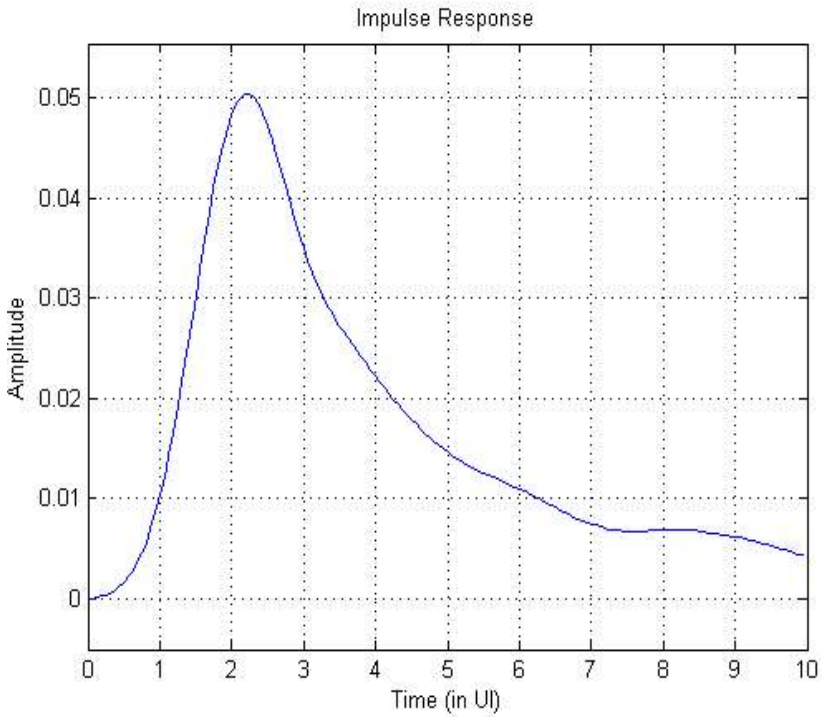
Channel Loss @ ½ Baudrate 10 dB

Penalty = 3.5 dB with 14/5 EQ



Channel Loss @ ½ Baudrate 25 dB

Penalty = 5.5 dB with 14/5 EQ



Conclusion

- **Backplane Ethernet legal transmitter are allowed to have large amount of low frequency jitter (i.e. 1 UI at 200 Khz) where the receiver may fail.**
  - ⇨This will result in significant interoperability issues especially with DFE based receiver which can not track the transmitter jitter.
- **Lack of TP4 output compliance test in conjunction with informative channel is the equivalent of "just flipping the switch and see if it works".**
  - ⇨Fortunately LRM has already developed the test methodology of TWDP and we just need to calibrate it for our application.
  - ⇨This is the minimum we can do for the user.