Supporting Material for Comment #161

Jeff Slavick

Supporters

- Charles Moore - Avago

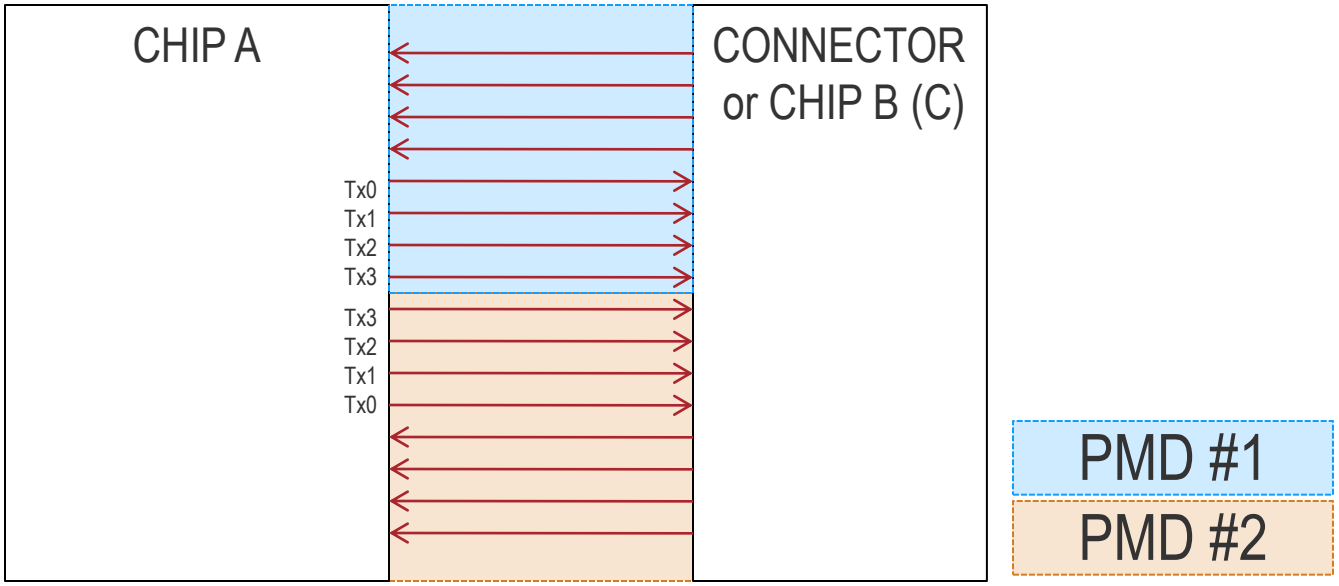
Background

- **Clause 92.7.12**
  - Adds 4 new PRBS11 polynomials to be used during PMD training. Each lane within a PMD uses a different polynomial.
  - Seed used for the PRBS11 training pattern is fixed. So we get a constant 4094 bit PRBS training sequence that is unique for each lane. (Clause 72 defines random seeding to occur. Total training frame is 512*8 = 4384 bits long)
- **Clause 93.7.12**
  - References 92.7.12

- **The new polynomials were added to reduce the correlated noise between lanes.**

Issue

- Chips, Boards, and Connectors will have multiple PMDs going through them. The physical instantiation of the PMD may have mirroring such that we can see the same PMD Lane from two different PMDs routed side-by-side. In D2.0 we use a constant repeating pattern and will now have a chance of 100% correlation for the entire PMD training duration.



Proposed Solution

- **Remove the new text.**
  - Currently this is the only change we've made to KR4 and CR4 PMD training. (other then rate increase)
  - With the text as-is we will have a chance at 100% correlated noise between PMDs, which is worse then what we had in the past. Using the Clause 72 PMD training you may have correlated noise, but it wouldn't be 100% correlated for the entire training sequence.

Other options

- The following slides provide several possible solutions to minimize the occurrence of having the same PMD training pattern be executed by two lanes that are routed next to each other.

Solution Option #1

- **Remove the new text.**
  - Currently this is the only change we've made to KR4 and CR4 PMD training. (other then rate increase)
  - With the text as-is we will have a chance at 100% correlated noise between PMDs, which is worse then what we had in the past. Using the Clause 72 PMD training you may have correlated noise, but it wouldn't be 100% correlated for the entire training sequence.

Solution Option #2

- **Remove the requirement of using fixed seeds. Require a non-zero random seed for each lane (similar to 84.7.12).**
  - In theory this should prevent full correlation from occurring for the entirety of training.
  - This is what we currently specify in Clause 84 using the Clause 72 PRBS11 polynomial. So is adding the new PRBS polynomials necessary?
  - NOTE: non-zero is added to prevent a string 4096 bits zero's from being transmitted, since zero is a random number.

Solution Option #3

- **Add a MDIO register to allow management to modify the configuration of which PRBS sequence is used on which PMD lane.**
  - Add 4 sets of configuration bits to control which of the new PRBS sequences each lane of the PMD uses.
  - Add text to state that each lane within a PMD shall use a different PRBS sequence
- **Assumption is that source board layout arrangement is maintained and that re-twizzling of the signals doesn't occur as you cross onto other boards.**
- **This can be messy when a given board can slot into multiple Backplane locations, and the aggressors on the backplane will vary based on which slot it to goes into.**

Solution Option #4

- **Do both solutions #2 & #3 (Random seeds & configurability of which PMD lane uses which polynomial)**
  - This provides the most flexibility to allow a system to minimize the possibility of correlated noise.

Solution Option #5

- **Remove the new text.**
- **Change the PRBS sequence to PRBS31 (x^31 + x^28 +1)**
- **Require each lane within the PMD to use a different seed (2nd sentence of 84.7.12).**
  - Why not train using a PRBS sequence that is closer to random data then PRBS11.