
Options for Controlling DFE error propagation

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Supporters

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The Problem

- A long Mean Time To False Packet Acceptance (MTTFPA) is a basic requirement of the Ethernet standard
- The Ethernet CRC32 has considerable error detection capability
 - In addition to a hamming distance of 4, it can also detect any 32bit burst or any two 8-bit bursts in a packet.
 - This provides an MTTFPA in the billions of years
- The self-synchronous Scrambler in the 10GbaseR PCS has error propagation properties that compromise the burst error detection capabilities of the Ethernet CRC32
 - On its own this still yields an acceptable MTTPF because it is primarily a function of hamming distance for a non-bursty channel (walker_1_0300.pdf)
- However if a particular channel/DFE based receiver combination causes error bursts we have a problem
 - DFE Error bursts cascaded with 64b66b scrambling yield unacceptable MMTPFs

We are not alone

- Achieving an acceptable MTTFPA has been a hot topic in both EFM & 10GbaseT.
- Both added additional CRCs
 - 10GbaseT
 - Added an unscrambled CRC8 wrapper to their PCS frames
 - EFM
 - Added an additional fragment CRC16 or CRC32 in the PCS
- OIF CEI IA also addressed DFE Error multiplication
 - CEI constrained the tap weights of its reference receiver used to verify channel compliance in STATEYE.

Our Options

- **Ignore it and hope it will go away**
 - Not an option - it will turn up at WG ballot
- **Constrain channel**
 - No longer an option as our channel specification is only informative
- **Constrain DFE receiver tap weights**
 - Possible option
 - Down-side is determining the what constraints
 - We might end up back in a channel selection log-jam
- **Add a CRC8 wrapper**
 - Added an additional CRC8 wrapper to our frames
 - There is precedence for this - in 10GbaseT

Add CRC8 Option

- Add an additional CRC8 byte (as defined in 55.3.7) to all packets.
- The 64b66b PCS (clause 49) will not support addition of a data byte after the eop, So it must be inserted before the eop.
 - The CRC8 overwrites the eop and the eop is written over the first ipg character
 - This could be done within the clause 49 PCS, but can be done as easily by a sub-layer at the XGMII level
- Add a sub-layer above the clause 49 PCS
 - Shifts eop and inserts CRC8 byte on transmission
 - Checks CRC8, overwrites CRC8/EOP with EOP/IDLE