Further Thoughts on Scrambling for 10BASE-T1S

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Problem Statement

- Peak emissions are of critical importance for automotive applications and have direct correlation with peak transmit PSD.
- Scrambling the payload can be useful for industrial and other 10BASE-T1S applications.
- The scrambler proposed in [1] improves peak emissions, especially below 30 MHz.
- Some concerns were raised at Geneva meeting with scramblers.
- This presentation is intended to address these concerns.

[1] “Transmit Emissions Considerations for 10BASE-T1S” tazebay_3cg_01b_0118.pdf on 12/20/2017

Variable or Missing MAC Transmit Preamble

- Some vendors use the preamble space to carry proprietary information
  - Most proprietary formats operate at rates above 10Mbps.
- These vendor modes are not compliant to 802.3 Clause 22.2.2.3.
  - Ethernet MACs are not supposed to loose any preamble in TX direction.
- How to resolve non-compliant short preambles with transmit-direction MACs:
  - Preamble Octets are 0x55
  - When TX_EN asserted, 10BASE-T1S PHY looks for 0x55 and SFD octets from MAC.
  - If short/missing preamble sent, buffer TX data until all octets of preamble sent
  - With short/missing preamble this will trim some IPG, but is not an issue.
- Variable or missing MAC preamble in TX direction does not mean PHY has to truncate the Layer-1 preamble.
- A full-length preamble with robust synchronization should be used for 10BASE-T1S.

“Killer” DME Packets

- Any scrambler can have certain payloads which will have correlation with the scrambler.
- DME is DC balanced – even a packet which is completely correlated with scrambler seed will have no impact on receiver performance.
- Some other line codes, like NRZ, when scrambler has correlation with data can induce a large DC value on the line which will require a DC offset canceller or other techniques at RX to resolve.
- During normal operation, the proposed scrambler for 10BASE-T1S will reduce peak emissions.

Summary

- Short or missing preamble from MAC in TX direction is not an issue.
- So called “Killer” packets are not an issue in operation for DME in a closed network.
- Propose to adopt changes to manage variable or missing preamble from MAC in TX direction so a full-length preamble may be utilized.
- Propose to adopt changes to add sidestream scrambler to Clause 147.

Thank You!