Working Session – Path forward for PHY decisions

11/15/2023

G. Zimmerman/ CME Consulting(various)
(working session notes as Chair)

IEEE 802.3dg 100Mb/s Long Reach Single Pair Ethernet PHY
Task Force

What do we need to decide for PHY baselines

- How do we deal with the low latency (1.5 usec, 100m) application?

- How do we get to our reach objective?

- What kind of impulse noise do we need to tolerate?

- What level of stationary (AWGN) noise do we need in addition to impulse noise?

- What kind of latency can we tolerate for the long reach application?

- Do we need to maintain bounded voltage (intrinsic safety) during training? – YES.

IEEE 802.3dg 100Mb/s Long Reach Single Pair Ethernet PHY Task Force

PHY implementation issues to investigate

- FEC Block coding & interleave techniques

- Impact of PCS encoding (e.g., 64/65b encoding) on latency

- PMA training – how deal with synchronizing any FEC structure

IEEE 802.3dg 100Mb/s Long Reach Single Pair Ethernet PHY
Task Force

PHY issues to investigate to decide PMA/PCS baselines

- Can we meet the 500m objective (vs. PAM levels)?
  - Do we need coding gain to get there?
    - Probably not a discriminator w/AWGN, may be a discriminator w/impulse noise
- Error propagation impact on error rate? (effective coding gain loss)
  - Note – this is of the entire PMA/PCS system
  - May favor lower PAM levels, but makes bursts longer in # of symbols.
- Impact and feasibility of a > 1Vpp transmit mode
  - Does this limit us? (intrinsic safe needs 1Vpp mode due to clamping, question is whether 2.4Vpp is needed and doesn't create additional problems)
- Modeling for nonstationary (impulsive) noise
  - Does the EFT test give enough specificity?
- Compatibility with powering – Clause 104 & Ethernet APL
  - Ethernet APL has 2 link segment types – this is linked to the 1Vpp mode as well
  - 100BASE-T1L may need a spur link segment specification & a motor control link segment
- Compatibility with a low latency mode

IEEE 802.3dg 100Mb/s Long Reach Single Pair Ethernet PHY Task Force

Things we need (modeling files)

- S-parameter or impulse-response model of target line
  - (insertion loss & return loss, 500m 5 connector line, 100m motor control line)
  - Need standard frequency to time domain conversion algorithm (see Jonsson cy contribution)
  - Need frequency resolution & bandwidth specifications
- Model for highpass/lowpass to use with power coupling
- AWGN target noise level
  - Pass through a filter with the agreed alien crosstalk level
  - Applicable only to the long-reach line.
- Impulse noise model (s)
  - Dayin/George – to contact Piergiorgio for some models
  - David Brandt – will also look
- Follow up call – Monday Nov 27 – to be scheduled.

Straw Poll

- I support (choose 1):
  - A: We need to define a new MII in 802.3dg
  - B: We need to define a new MII and we should do it in a new project
  - C: We do not need to mess with the MII – we can leave this outside the standard
  - D: Abstain / No opinion

A:6+5=11

B:2+1=3

C:1

D:5+2=7

IEEE 802.3dg 100Mb/s Long Reach Single Pair Ethernet PHY Task Force