Working Objectives : >10 Mb/s long-reach SPE

G. Zimmerman/ADI, APL Group, Cisco, CommScope, Marvell, SenTekSe

10/27/2021 (meeting output)

Suggested Basic PHY Objectives

Consensus:

1. Preserve the IEEE 802.3/Ethernet frame format at the MAC client service interface.
2. Preserve minimum and maximum frame size of the current IEEE 802.3 standard.
3. Do not preclude meeting FCC and CISPR EMC requirements
4. Support for optional single-pair Auto-Negotiation
5. Do not preclude the ability to survive industrial fault conditions (e.g., shorts, overvoltage, EMC)
6. Do not preclude working within an Intrinsically Safe device and system as defined in IEC 60079

Need consensus built:

1. Not require any changes to the IEEE 802.3 MAC
2. (PHY to) Be compatible with (existing?) (IEEE 802.3?) single-pair DC powering techniques

Speed-Specific Objectives (100 Mb/s)

Consensus:

1. Support a speed of 100 Mb/s at the MAC/PLS service interface.
2. Support 100 Mb/s single-pair Ethernet operation in industrial environments (e.g., EMC, temperature).
3. Maintain a bit error ratio (BER) at the MAC/PLS service interface of less than or equal to 10^{-10} or the frame loss ratio equivalent
4. Support a low latency mode of operation with ≤ 1.5usec latency for constrained link segment specifications (e.g., insertion loss or noise)

To work:

1. Define performance characteristics of a link segment with a single balanced pair of conductors supporting up to 10(TBD) inline connectors for up to at least (TBD: 400m/500m) reach, and a PHY supporting point-to-point full duplex operation over the link segment.

Speed-Specific Objectives (1000 Mb/s)

Should consider all the 100 Mb/s rewording on the previous page, and need presentations supporting these & the CSDs (especially reach & tech feasibility from a PHY SME perspective)

1. Support a speed of 1000 Mb/s at the MAC/PLS service interface.
2. Support 1000 Mb/s single-pair Ethernet operation in industrial environments (e.g., EMC, temperature).
3. Define performance characteristics of a link segment with a single balanced pair of conductors supporting up to 10(TBD) inline connectors for up to at least (TBD: 100m/300m/500m (TBD, ≥ 100m) reach, and a PHY supporting point-to-point full duplex operation over the link segment.
4. Maintain a bit error ratio (BER) at the MAC/PLS service interface of less than or equal to TBD (10^{-10}) or the frame loss ratio equivalent
5. Latency objective?

POTENTIAL ADDITIONAL FEATURE OBJECTIVES

Consensus:

- Power:
  - Specify one or more optional power distribution techniques for use in conjunction with 100 Mb/s single-pair Ethernet PHYs over one or more of the single-pair segments

May need wordsmithing:

- EEE:
  - Support optional Energy Efficient Ethernet (possibly additional qualifiers or “energy efficiency”)

To Consider – do we need this for long-reach?

- Startup:
  - Support fast-startup operation using predetermined configurations which enables the time from power_on=FALSE to a state capable of transmitting and receiving valid data to be less than 100ms