Strawman Objectives – Long Term long-reach SPE

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6/23/2021

Long-reach SPE

- The project has gotten into discussion of vehicular and mobile-machine applications
  - These were the basis for 100BASE-T1 and 1000BASE-T1 “link segment B”
- A standards project needs focus
- Drafting minimum objectives brings that focus
  - Additional features, rates, PHYs can then be considered based on value-add and work required

Suggestions

- Start with 802.3cg objectives, relevant to long-reach PHY
- Focus on 100 Mb/s rate
  - Focus on Industrial and Building Environments
  - Determine reach and link segment requirements necessary for Broad Market Potential, Distinct Identity, and effective deployment
  - Determine any other special requirements
- THEN – consider what additions are within reach and add sufficient value to expand the project

802.3cg objectives

Objectives (1 of 3) – approved by 802.3 on 3/8/18

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. Support a speed of 10 Mb/s at the MAC/PLS service interface.
4. Do not preclude meeting FCC and CISPR EMC requirements
5. Support for optional single-pair Auto-Negotiation
6. Support optional Energy Efficient Ethernet
7. Support 10 Mb/s single-pair Ethernet operation in automotive environments (e.g. EMC, temperature).
8. Support 10 Mb/s single-pair Ethernet operation in industrial environments (e.g. EMC, temperature).
9. Do not preclude the ability to survive automotive and industrial fault conditions (e.g. shorts, over voltage, EMC, ISO16750)
10. Do not preclude working within an Intrinsically Safe device and system as defined in IEC 60079

Generic

Industrial

Features
(Autoneg, EEE)

Automotive

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More .3cg Objectives (PHYs and Reach)

Objectives (2 of 3) – approved by 802.3 on 3/8/18

11. Define performance characteristics of the following:
    a. A link segment with a single balanced pair of conductors supporting up to 4 inline connectors for up to at least 15 m reach
    b. A mixing segment with a single balanced pair of conductors supporting up to at least 8 nodes, for up to at least 25 m reach
    c. A link segment with a single balanced pair of conductors supporting up to 10 inline connectors for up to at least 1 km reach
12. Define a PHY:
    a. Supporting point-to-point half-duplex operation over the 15 m link segment
    b. Optionally supporting full-duplex operation over the 15 m link segment
    c. Optionally supporting half-duplex multi-drop operation over the 25 m mixing segment
13. Define a PHY:
    a. Supporting point-to-point full-duplex operation over the 1 km link segment

Not long-reach

Not pt-to-pt (SCOPE)

Long-reach pt-to-pt SPE

Not long-reach

Not pt-to-pt (SCOPE)

Long-reach pt-to-pt SPE

Startup, BER, and Powering Objectives

Objectives (3 of 3) – approved by 802.3 on 3/8/18

14. 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

15. Maintain a bit error ratio (BER) at the MAC/PLS service interface of less than or equal to:
    a. 10^{-10} on link segments up to at least 15m
    b. 10-10 on mixing segments up to at least 25m
    c. 10^{-9} on link segments up to at least 1000m

16. Specify one or more optional power distribution techniques for use in conjunction with 10 Mb/s single-pair Ethernet PHYs over one or more of the single-pair segments

Feature (Startup)

Generic

Need a BER spec per PHY/link segment

Feature (Power)

Suggested Starting Point Objectives

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. Support a speed of 100 Mb/s at the MAC/PLS service interface.
4. Do not preclude meeting FCC and CISPR EMC requirements
5. Support for optional single-pair Auto-Negotiation
6. Support 100 Mb/s single-pair Ethernet operation in industrial environments (e.g., EMC, temperature).**
7. Do not preclude the ability to survive industrial fault conditions (e.g., shorts, overvoltage, EMC)
8. Do not preclude working within an Intrinsically Safe device and system as defined in IEC 60079
9. 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: 1 km/500m/(TBD, > 300m) reach, and a PHY supporting point-to-point full duplex operation over the link segment. **
10. Maintain a bit error ratio (BER) at the MAC/PLS service interface of less than or equal to TBD**

** NOTE: THESE WILL NEED TECHNICAL FEASIBILITY PRESENTATIONS

POTENTIAL ADDITIONAL OBJECTIVES

- 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
- 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
- EEE:
  - Support optional Energy Efficient Ethernet

- ADDITIONAL RATES / REACHES:
  - Add to other objectives, with similar text
  - Note these need MORE tech feasibility work
  - These may substantially add to the difficulty of the project, except where the PHY (and sometimes the link segment) specifications simply scale with the rate

Discussion?

- Parameters:
  - 1 connector per 100m length (+2?)
    - Presentation requested to explain assumptions
  - Distance varies with cabling parameters, and this may influence whether the cable is useful for a particular application
    - Does this mean different link segments, or is one a subset of the other?
    - Related to Broad Market Potential
- Requests for discussion of mixed fiber/copper networks and how they relate in the overall applications & their requirements