

# Objectives Update

IEEE 802.3

10 Mbps Single Pair Ethernet Study Group

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Ad Hoc 9/26/16

# Overview

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- This presentation compares the adopted objectives, those identified for discussion, and those submitted to the study group in `brandt_10SPE_01a_0916.pdf` and `tazebay_10SPE_01_0916.pdf`
- The intent is to identify unified objectives which remain to be addressed, and to identify work areas

# Adopted Objectives (Sept Interim)

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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 operation in automotive environments (e.g. EMC, temperature) over single balanced twisted-pair cabling.
8. Support 10 Mb/s operation in industrial environments (e.g. EMC, temperature) over single balanced twisted-pair cabling.

# Objectives (need discussion from Sept Meeting)

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- Define the performance characteristics of a link segment and a PHY to support point-to-point operation over this link segment with single twisted pair supporting up to four inline connectors using balanced cabling for at least 15 m reach.
- Support optional low power mode (e.g., Energy Efficient Ethernet).
- Maintain a bit error ratio (BER) of less than or equal to  $10^{-10}$  at the MAC/PLS service interface.
- Support optional power delivery over 10 Mb/s single twisted-pair data links
- **THESE ARE: LINK SEGMENT, BER, POWERING, AUTOMOTIVE REWORDING ON THE LOW POWER MODE.**

# Addressed Industrial from brandt\_10SPE\_01a\_0916.pdf

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- ✓ Preserve the 802.3 / Ethernet frame format utilizing the 802.3 MAC
- ✓ Support a data rate of 10Mbps at the MAC/PLS service interface
- ✓ Do not preclude meeting FCC and CISPR EMC requirements
- ✓ Preserve minimum and maximum Frame Size of current 802.3 standard
- ✓ Support for optional single-pair Auto-Negotiation
- ✓ Support optional Energy Efficient Ethernet
- ✓ Support 10 Mbps operation in industrial environments

# Remaining Industrial from brandt\_10SPE\_01a\_0916.pdf

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- Define the performance characteristics of link segments and one or more PHYs to support point-to-point operation over this link segment with single twisted pair supporting inline connections using balanced cabling
- Support a BER better than or equal to  $10E-9$  at the MAC/PLS service interface
- Do not preclude working within an Intrinsically Safe device and system as defined in IEC 60079
- Specify an optional power distribution technique for use over the 10 Mb/s single twisted pair link segments in conjunction with 10Mbps single-pair PHYs
- Define one or more PHYs to support each of the following options, where at least one option must be present:
  - up to at least 1000 m reach on an industrial link segment
  - up to at least 15 m reach on an industrial and automotive link segment
- **THESE ARE THE ISSUES OF:**
  - Link segment definition, PHYs, BER, Powering, Intrinsic Safety

# Addressed Automotive from Tazebay\_10SPE\_01\_0916.pdf

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- ✓ Support 10 Mb/s operation in automotive environments (e.g. EMC, temperature) over a single balanced twisted pair.
- ✓ Preserve the 802.3 / Ethernet frame format at the MAC client service interface
- ✓ Support a data rate of 10Mbps at the MAC/PLS service interface
- ✓ Preserve minimum and maximum Frame Size of current 802.3 standard
- ? Support optional low power mode (e.g., Energy Efficient Ethernet).
  - (Does the minor wording difference between this and the adopted objective matter?)
- ? The resulting standard will not preclude single pair auto-negotiation.
  - ✓ Support for optional single-pair Auto-Negotiation
    - (Does the minor wording difference between this and the adopted objective matter?)
- X Support full duplex operation only
  - (seems we have consensus against this)

# Remaining Automotive from Tazebay\_10SPE\_01\_0916.pdf

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- Maintain a bit error ratio (BER) of less than or equal to  $10^{-10}$  at the MAC/PLS service interface.
- Define the performance characteristics of a link segment and a PHY to support point-to-point operation over this link segment with single twisted pair supporting up to four inline connectors using balanced cabling for at least 15 m reach.
- 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.
- Do not preclude the ability to survive automotive fault conditions (e.g. shorts, over voltage, EMC, ISO16750).
- Support optional operation with run-time configuration, that specifies a maximum allowable time from power\_on \*\*=FALSE to a state capable of transmitting and receiving valid data.
- Support optional bus topology for applications up to 15 m.
- Support optional Power over Data Line.
- **THESE ARE THE ISSUES OF:**
  - Link segment definition, PHYs, BER, Powering, Startup, Faults, Bus Topology



# Ground fruit (strawberries)

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- Do not preclude working within an Intrinsically Safe device and system as defined in IEC 60079
- Do not preclude the ability to survive automotive fault conditions (e.g. shorts, over voltage, EMC, ISO16750).

# Low hanging fruit

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- Maintain a bit error ratio (BER) of less than or equal to  $10^{-(9 \text{ or } 10)}$  at the MAC/PLS service interface.
  - Can we settle on  $10^{-10}$  and work the testing issue in the spec?

# Link Segment/PHY dependent

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- Recommend we call out the PHYs and links segments for 15m and 1km as follows:
  - Define the performance characteristics of a link segment and at least one PHY to support point-to-point operation over this link segment with single twisted pair supporting up to four inline connectors using balanced cabling for at least 15 m reach.
  - Define the performance characteristics of a link segment and a PHY to support point-to-point operation over this link segment with single twisted pair supporting up to TBD inline connectors using balanced cabling for at least 1 km reach
    - Can we fill in the TBD? Do we have consensus on 1 km?

# Powering: 802.3bu Objectives

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- (Existing 802.3bu objectives): #1, 3 are probably needed, others?
  1. Specify a power distribution technique for use over a single twisted pair link segment.
  2. Allow for operation if data is not present.
  3. Support voltage and current levels for the automotive, transportation, and industrial control industries.
  4. Do not preclude compliance with standards used in automotive, transportation, and industrial control industries when applicable.
  5. Support fast-startup operation using predetermined voltage/current configurations and optional operation with run-time voltage/current configuration.
  6. Ensure compatibility with IEEE P802.3bp (e.g., EMI, channel definition, noise requirements).

# Discussion Items/Work Needed

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- Powering:
  - How much power delivered, under what conditions (use cases)?
  - Are there limiting cases on the 2 link segments?
  - Are these needed in the objective wording?
- Bus/Multipoint topology:
  - If this is going to be an objective we need enough detail to teach how it relates to the 802.3 MAC to those outside the room, and, we need to do it?f
  - What are the limits of this? (# of nodes, link segment, etc.)
  - If we add this, is there a corresponding powering objective?
- Automotive fast startup:
  - What does this mean?:
    - “Support optional operation with run-time configuration, that specifies a maximum allowable time from power\_on \*\*=FALSE to a state capable of transmitting and receiving valid data.”
- Anything else?