

10SPE - 10 Mb/s Single Twisted Pair Ethernet Study Group Reflections of AdHoc Chair & System Vendor November 2016

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What's this about?

The goal is to put forward some opinions/discussion points to help us move forwards.

The presenter believes that we are ready to move into Task Force with an initial set of objectives.

We can start work on items we already have good consensus on, and also work to build consensus on some other items.

Adopted Objectives

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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 for consideration – compilation, general consensus from ad hoc

9. Define the performance characteristics of a link segment and at least one PHY to support operation over this link segment with single twisted pair supporting up to four inline connectors using balanced cabling for at least 15 m reach.
10. 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 10 inline connectors using balanced cabling for at least 1 km reach
11. Do not preclude working within an Intrinsically Safe device and system as defined in IEC 60079
12. Do not preclude the ability to survive automotive and industrial fault conditions (e.g. shorts, over voltage, EMC, ISO16750).
13. 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.
14. Support voltage and current levels for the automotive and industrial environments.

Big Ticket – Point to Point vs MultiDrop

Point to Point vs MultiDrop

Xu_10SPE_02_1116.pdf describes the Factory Automation Use Case for Daisy Chain Power Delivery.

Also references brandt_10SPE_02_0916.pdf and brandt_083116_10SPE_01_adhoc.pdf

yseboodt_10spe_01_1116.pdf proposes the following objective:

Investigate an optional multidrop mode for 10SPE. The MAC protocol to be chosen from MAC protocols already in 802.3.

From zimmerman_10SPE_01_1116.pdf.

while Multidrop is within scope of the project, the decisions needed for the technical and economic feasibility CSD responses are out of scope of the Study Group.

About Multi-drop PHYs

- With our current wording, Multi-drop is within the scope and intent of our PAR and CSDs
 - Both target markets use some multi-drop
 - None of the PAR and CSD language limits to point-to-point
- Multi-drop (shared-media) PHYs need to be considered in the context of a media access protocol
- To meet the “802.3 MAC” objective, we don’t just need examples, need to make a technical decision on the media access method.
 - Study Groups do NOT make technical decisions

Therefore, we SHOULD NOT add a multi-drop PHY objective in Study Group, and, we MAY add one in Task Force, with additional specificity to align it to the 802.3 MAC

Point to Point vs MultiDrop

The presenter believes

We have no consensus for technical/economic feasibility yet, particularly considering the MAC protocol requirements (e.g. CSMA/CD would break 802.1 TSN) and the complexity of powering techniques.

As of today, our draft PAR, CSD and objectives allow us to work on multidrop in the TF, but do not promise delivery.

We need the same percentage vote (75%) to adopt a baseline or progress a draft, as to add a new objective.

We should defer multidrop (data and power) to TF discussion, where we can make technical decisions, and modify/adopt objectives as appropriate.

Smaller Items

(mostly ordered as per [zimmerman_10SPE_01_1116.pdf](#))

Proposed Objective: BER

The proposed objective states

Maintain a bit error ratio (BER) at the MAC/PLS service interface of less than or equal to:

10^{-10} on link segments up to at least 15m, and

10^{-9} on all link segments up to at least 1km

The presenter believes this clear and ready to adopt - Motion #5 from motions_01_10SPE_1116.pptx.

Proposed Objective: Run-time configuration startup

The proposed objective states

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.

The presenter believes this is already covered under the “predetermined configurations startup” objective 13 (see below) and the “run-time configuration startup” objective is not required.

13. 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.

The justification here is that the only difference between the “predetermined configurations” and “run-time configuration startup” is system processing time that is out of our scope.

Proposed Objective: Impulse Tolerance

The proposed objective states

Maintain link in the presence of nonrepetitive impulse events lasting up to at least 50 msec.

Possibly substitute “transient” for “nonrepetitive”

The presenter believes this is already covered under *adopted objectives 7 & 8*, and no additional objective is required.

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.

Power Objectives

The proposed objectives state:

- 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

- Optionally support 802.3bu PoDL, with possible augmentation, on at least the 15m link segment

The presenter believes that:

- We are looking at a wide range of power levels (200mW to 60W), reaches (1m to 1000m) constraints (e.g., Intrinsic Safety) and channel resistance.

- We do need to address the ability to build a 10/100/1000 BASE-T1 ecosystem with common support for power.

So what should we do?

- Attempt to reuse PoDL at shorter reaches (e.g. lower resistance link segment)

- Augment PoDL or define another scheme to address higher resistance link segments (e.g. long industrial runs).

The presenter believes that we should adopt the following objectives:

- Optionally support 802.3bu PoDL, with possible augmentation, on appropriate link segments.

- Optionally support power distribution over the 10 Mb/s single twisted pair link segments in conjunction with 10Mbps single-pair PHYs.

Proposed Objective: #14

The proposed objective states

14. Support voltage and current levels for the automotive and industrial environments.

The presenter believes this is already covered under adopted objectives 7 & 8, and objective 14 is not required.

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.

Optional MDI definition

In jones_10spe_02_0916.pdf, the presenter stated :

Optional MDI definition?

The need for a standard MDI is related to network construction and life cycle

Highly desirable in many environment to enable mix & match in converged networks that serve more than one need. RJ45 has served us well!

Maybe a couple of options for different environmental conditions (like RJ45 and IP67/M12 are used today)

The presenter believes this is this is another item that we should defer to TF discussion, where we can make technical decisions, and modify/adopt objectives as appropriate.

In Summary

The presenter believes that:

- We have a set of basic objectives that we can work towards.
- Additional objectives need more technical work, and should be address during the Task Force phase.
- We are ready to move to Task Force and start the next phase of work.

Possible Motions

(as modified from motions_01_10SPE_1116.pptx)

Motion #4 - updated

- Move to adopt Objectives #9 through ~~#14~~ **#13** on page 4 of [zimmerman 01 10SPE 1116.pdf](#)
- M: xxx S: yyy
- Y: N: A: Technical ($\geq 75\%$)
- Motion Passes/Fails

Motion #6 - updated

- Move to adopt the following objectives:

Optionally support 802.3bu PoDL, with possible augmentation, on appropriate link segments.

Optionally support power distribution over the 10 Mb/s single twisted pair link segments in conjunction with 10Mbps single-pair PHYs.

- M: xxx S: yyy
- Y: N: A: Technical ($\geq 75\%$)
- Motion Passes/Fails

Thank You!

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