

Refinements on Key Text for PAR, CSD and Objective for ISAAC

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Introduction

- This deck represents some refinement on PAR, CSDs, and objectives text, and thoughts for what is needed to complete the study group's work. It is meant at this point to try to get alignment on text.
 - The intent is to focus the study group supporting presentations needed to confirm a PAR and CSDs and on determining key parameters (speeds, reaches, etc.).
 - The parameters here have been drawn from the justifications of existing projects and the CFI deck. While changing them is feasible, it will need supporting presentations.

PAR

Key items: Scope, Need, and Stakeholders

Suggestion for PAR Scope

- Specify additions to and appropriate modifications of IEEE Std 802.3 to add:
 - Physical Layer specifications and management parameters for electrical media and operating conditions for applications in the automotive environment for operation up to 10 Gbps in one direction and up to **Y** Mbps in the other direction, and
 - A protocol or sublayer for interfacing a physical layer device with different data rate capabilities in the transmit and receive directions to the existing 802.3 MAC with media independent interfaces at existing 802.3 rates.
- If this wording is acceptable, the key points are agreement on the lower-speed direction rate (Y).
 - The CFI deck supports a value of up to 100 Mbps.

Suggestion for need/stakeholders section

- **Need** – Automotive in-vehicle **and IoT** networks have begun a transition to Ethernet. Multigigabit links such as imaging sensors at end-nodes of the network where the backchannel is low bandwidth are important parts of this transition. These end-nodes are highly constrained on complexity and power consumption and converting them to Ethernet will require solutions specified for their operating conditions. ~~IEEE Std 802.3 currently does not specify PHYs for the automotive environment specialized for traffic with such different throughput requirements in each direction.~~
- **Stakeholders** – End-users, automotive Original Equipment Manufacturers (car makers) and Tier x automotive suppliers, system integrators, and providers of systems and components (e.g. 4K and 8K cameras, sensors, actuators, artificial intelligence (AI) processors, instruments, controllers, network infrastructure, user interfaces, and servers) for automotive **and IoT** applications.

Key changes are:

Deleted the statement “what 802.3 does NOT do” – this is not needed by NesCom and can be difficult to parse

Highlighted text to include IoT stakeholders for discussion among the study group

CSDs

CSDs

- ✓ Managed Objects – project will contain objects
- ✓ Coexistence – not a wireless project
- Market Potential – Broad applicability, numerous vendors & users
 - Reference support of the CFI, can use reference presentations on applications
- Compatibility –
 - Compatible with the 802.3 MAC, Compliant with the 802 architecture
 - Need to double check asymmetric rate compatibility with 802.1 documents
- Economic/technical feasibility –
 - These will be filled out based on technical contributions to the study group.
 - Presentations on technical approaches and economic feasibility are needed.

Distinct Identity

- Distinct identity –
 - There are no reconciliation sublayers in IEEE Std 802.3 that support connecting PHYs with asymmetric data rate limitations to the MAC without an additional MAC control sublayer.
 - There are no PHYs in 802.3 that support multigigabit rates and one direction, but only support rates to **100 Mbps** in the opposite direction for automotive applications.
- Notes –
 - Rate here needs to align with PAR scope and objective (if done)
 - Anything 1 Gbps or above needs to differentiate from EPON
 - Differentiating on automotive is OK, but weaker...

Objectives

Generic Automotive Objectives

- Preserve the IEEE 802.3/Ethernet frame format at the MAC client service interface
- Preserve minimum and maximum frame size of the current IEEE 802.3 standard
- Support operation in automotive environments (e.g., EMC, temperature)
- Do not preclude meeting FCC and CISPR EMC requirements.
- At the MAC/PLS Service interface, only support full duplex operation

Common objectives requiring a little discussion

- Do not preclude power delivery over the link segment
 - Do we need to say more? (would need contributions)
- Define optional startup procedure which enables the time from power_on=FALSE to a state capable of transmitting and receiving valid data to be less than 100 ms
 - Competition starts up faster than 100ms – do we need to too? (would need contributions)
- Suggest we leave these for later (post-Oct) discussion:
 - Support optional auto-negotiation
 - Support optional energy-efficient ethernet
 - Support for TSN elements (need to get specific)
 - Any latency requirement

Speeds and reach

- Define the performance characteristics of an automotive link segment supporting up to four inline connectors for at least 11m on both automotive coax and shielded balanced pair media and an electrical PHY to support up to at least 10 Gb/s point-to-point operation over this link segment in one direction and up to 100 Mb/s in the other direction over the link segment.

Notes:

- Numbers for reach and rates are expected to come from Technical & Economic feasibility as well as needs. Initial numbers are from the CFI deck and the latest automotive project (802.3cy):
- Reach taken from 802.3cy, as a reasonably justified number – other can be justified
- Media is from the CFI deck – is this sufficient?
- Rates need to track with PAR wording
 - Requires some discussion and probably some technical feasibility and market potential presentations
- Can we dodge determining rates & reaches altogether?
 - If we do NOT have them, we need something else to define the scope of the PHY part of the project and something else to measure technical & economic feasibility from!

Reconciliation Sublayer

- Define a reconciliation sublayer (including any necessary client interfaces) to coordinate the PHY's speed capabilities with the MAC's operation

This is a generic suggestion for discussion

BACKUP / REFERENCE

Our Jobs

- At a high level - define a Project to Specify a Solution
 - Not – Pick a Solution by Specifying a Project
- Our Near-Term Outputs:
 - Required: PAR (especially the Scope, Need, Stakeholders)
 - Required: CSD Responses (especially compatibility, technical & economic feasibility)
 - Optional: Objectives (specific points needed in the standard)
 - Generally need enough detail to give meaning to our CSD responses
 - Objectives can be added and/or refined later by 802.3 without major difficulty

Sample PAR Scopes

EEE (802.3az)

- The proposed standard will include a symmetric protocol to facilitate transition to and from lower power consumption in response to changes in network demand. The transition will not cause loss of link as observed by higher layer protocols. The project will also specify PHY enhancements as required for a selected subset of PHY types to improve energy efficiency.

Note this is written in a previous, outdated PAR style, the PAR form has changed since. Says what the project goal is...

PHY project (802.3cy)

- Specify additions to and appropriate modifications of IEEE Std 802.3 to add greater than 10 Gb/s electrical Physical Layer specifications for symmetrical and asymmetrical operation and management parameters for media and operating conditions for applications in the automotive environment.

Note this is written for just a physical layer specification (PHY and RS). Very specific, except for the actual speed.

Sample PAR Scopes (cont'd)

EFM (802.3ah)

- Define 802.3 Media Access Control (MAC) parameters and minimal augmentation of the MAC operation, physical layer specifications, and management parameters for the transfer of 802.3 format frames in subscriber access networks at operating speeds within the scope of the current IEEE Std 802.3 and approved new projects

Note this is written in a previous, outdated PAR style, the PAR form has changed since.

Very broad, speeds can be specified...

MAC Control Project (802.3br)

- The scope of this project is to specify additions to and appropriate modifications of IEEE Std 802.3 to add support for interspersing express traffic over a single physical link.

Very Generic... Just the purpose