Potential Objectives, CSD and PAR

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16 August 2023

Role of a Study Group

- Define a Project to Specify a Solution
  - We are NOT here to pick a specific solution!
- Outputs from the Study Group
  - PAR
  - CSDs
  - Objectives: Can be more easily changed during the project as they reside within IEEE 802.3

PAR

- Sections that need to be modified:
  - Scope of the Project
  - Need for the Project
  - Stakeholders for the Standard
  - Optional: Additional Explanatory Notes

PAR: Scope samples

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Note this is written in a previous, outdated PAR style, the PAR form has changed since.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

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Note this is written in a previous, outdated PAR style, the PAR form has changed since.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

Suggestion for PAR Scope

- Specify additions to and appropriate modifications of IEEE Std 802.3 to add:

  1) Electrical Physical Layer specifications and management parameters for media and operating conditions for applications in the automotive environment for asymmetrical operation with peak rates of up to X Gbps in one direction and peak rates of up to Y Mbps in the other direction, and

  2) a protocol for interfacing a PHY with asymmetric peak data rate capabilities to the existing 802.3 MAC with media independent interfaces at existing 802.3 rates.

NOTE – this doesn't directly mention power delivery or media. We may wish to discuss adding coax specifically. Previous PHY projects for automotive did not specifically mention power delivery in the scope, adding it in was one of the "additions" to support the new PHY.

PAR: Need for the Project

- ## Using 802.3cy as a starting point!

  - Automotive in-vehicle networks have begun the transition from legacy electronic architectures (domain-based) to zonal architectures using Ethernet links to support fully autonomous operation. This has generated a need for data rates greater than 10 Gb/s in the automotive environment. IEEE Std 802.3 does not currently support rates greater than 10 Gb/s in the automotive environment.

- ## Needs for ISAAC should be similar but with optimizations for asymmetrical data rate capability

PAR: Suggestion for Need for the Project

- Automotive in-vehicle networks have begun the transition from legacy electronic architectures (domain-based) to zonal architectures using Ethernet links to support fully autonomous operation. Multigigabit asymmetric links, such as imaging sensors at end-nodes of the network are important parts of this transition and are highly constrained on complexity and power consumption. Converting these links to Ethernet will require solutions optimized for a known asymmetric data rate capability. IEEE Std 802.3 does not currently support PHYs with asymmetric data rate capabilities in the automotive environment.

- Question: Do we add something to reflect IoT sensors or other applications? If so, how?

PAR: Stakeholders of the Project

- Using 802.3cy as a starting point!
  - 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 applications.

- Question: Other areas may benefit from the asymmetric data rates above the PCS/PMA/PMD level for use with future PHYs.
  - Should they be represented in the stakeholder portion? If so, how?

CSDs

- **Straightforward Items**
  - Managed Objects
  - Coexistence

- **Items that require some work**
  - Market Potential
    - Broad applicability, numerous vendors/users/customers
    - CFI has much of this information, need to reformat into something that makes sense.

CSDs – cont'd

- Items that need more work

  - Compatibility

    - Is rate-pacing technically feasible with existing 802 standards?

  - Distinct identity

    - Asymmetric flow control should be easy, but the PHY part may take some work, as symmetric standards also support asymmetric traffic. This may depend on PHY objectives

CSDs – cont'd

- Items that need contributions to the Study Group
  - Economic feasibility
  - Technical feasibility

Objectives

- ## General and 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

  - 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 100ms

  - Support operation in automotive environments (e.g., EMC, temperature)

  - Do not preclude meeting FCC and CISPR EMC requirements.

  - Support full duplex operation only

- ## Common features that may require modification/discussion

  - Auto-negotiation

  - Optional EEE

  - Optional power delivery

Objectives – cont'd

- Define the performance characteristics of an automotive link segment supporting up to four inline connectors for at least 15m on at least one type of automotive cabling (e.g., UTP, STQ, STP, SPP, Coax, or Twinax) and an electrical PHY to support up to X Gb/s point-to-point operation over this link segment in one direction and up to Y Mb/s in the other direction over the link segment.
  - Should we leave the speeds open ("up to"), or fix them?
  - Do we need to nail down the medium type (e.g., only STP & Coax)

Other Possible Objectives / Final Thoughts

- ## Compatibility with TSN?

  - Probably need to break this down to a functional requirement

- ## Should we mention latency?

- ## Do we define a protocol to detect asymmetric operation?

  - From 802.3az: "Define a protocol to coordinate transitions to or from a lower level of power consumption"

  - Maybe: "Define a protocol to coordinate the PHY's speed limitations to the MAC"

  - Are there key functional requirements to be captured?

  - (e.g., compatibility with TSN, latency < 1 ethernet frame?)

Timeline to November Task Force

- In the interest of moving quickly the following timeline would potentially allow the creation of a TF in November
  - PAR and CSDs need to be pre-circulated at least 30 days in advance of the opening plenary meeting: Oct 12th
  - Planned Interims:
    - August 16 (today) and August 28
    - Quiet week prior to September interim: 4-8 September
    - Study Group meets during September interim (tentative Thursday)
    - This leaves the possibility for 2-4 interim teleconferences.

Potential Future Meetings after Campinas

- If we make significant progress in Campinas:
  - Suggest 2 contingent interim teleconference meetings
    - 27 September 2023: 08:00-10:00 CDT
    - 4 October 2023: 08:00-10:00 CDT

- If we haven't made significant progress in Campinas what additional meeting times are available?
  - Week immediately after Sept IEEE interim is automotive Tech day. Are participants able to meet that week?
  - Meeting the week of October 9th is very difficult for me and the day/time would have to change.

- Thoughts on these dates or other dates that might work?

Thank You