A Proposal of PAR splitting

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Objective

AGC
Your Dreams, Our Challenge

In order to resolve deadlock situation, I would like to revisit PAR splitting.

The drafts of PAR, Objectives, and CSD of revised 802.3cz and new 802.3dh are revised according to inputs from colleagues during and after interim meeting on Feb 15th.

A proposal for PAR splitting (PAR)

Proposed by Yuji Watanabe

Clause	802.3cz Current	802.3cz modified	802.3dh new
2.1 Project Title	Standard for Ethernet Amendment: Physical Layer Specifications and Management Parameters for Multi-Gigabit Optical Automotive Ethernet	Standard for EthernetAmendment: Physical Layer Specifications and Management Parameters for multi-gigabit optical Ethernet using graded-index glass optical fiber for application in the automotive environment	Standard for EthernetAmendment: Physical Layer Specifications and Management Parameters for multi-gigabit optical Ethernet using graded-index plastic optical fiber for application in the automotive environment
4.2 Expected Date of submission of draft to the IEEE SA for Initial Standards Committee Ballot:	Mar-22	Nov-22	Jan-24
4.3 Projected Completion Date for Submittal to RevCom	Oct-22	Jun-23	Sep-24
5.1 Approximate number of people expected to be actively involved in the development of this project:	40	As it is	30
5.2.b Scope of the project	Specify additions to and appropriate modifications of IEEE Std 802.3 to add Physical Layer specifications and management parameters for multi-gigabit optical Ethernet for application in the automotive environment.	Specify additions to and appropriate modifications of IEEE Std 802.3 to add Physical Layer specifications and management parameters for multi-gigabit optical Ethernet using graded-index glass optical fiber for application in the automotive environment.	Specify additions to and appropriate modifications of IEEE Std 802.3 to add Physical Layer specifications and management parameters for multi-gigabit optical Ethernet using graded-index plastic optical fiber for application in the automotive environment.
5.3 Is the completion of this standard contingent upon the completion of another standard?	No	As it is	Yes Explanation: IEC 60793-2-40 has been proposed for early revision to address automotive applications. Wavelength of operation will be considered as well as bandwidth and attenuation specifications and mechanical properties.
5.4 Purpose	This document will not include a purpose clause	As it is	As it is
5.5 Need for the Project	Applications in automotive industries have begun the transition of legacy automotive networks to Ethernet to support Advanced Driver Assist Systems. This has generated a need for data rates greater than 1 Gb/s in the automotive environment. Optical fiber has been used in automotive applications both for Ethernet and other protocols. This project will complement other 802.3 projects working on specifications for electrical media operation at rates greater than 1 Gb/s in the automotive environment. The number of cameras in vehicles is increasing as is the camera data rate with movement to higher resolution video. Optical data links are applicable to both the vehicle network backbone as well as connection of selected devices where location or other factors favor using an optical link.	Applications in automotive industries have begun the transition of legacy automotive networks to Ethernet to support Advanced Driver Assist Systems. This has generated a need for data rates greater than 1 Gb/s in the automotive environment. Optical fiber has been used in automotive applications both for Ethernet and other protocols. This project will complement existing IEEE Std 802.3 Electrical Automotive Ethernet specifications for electrical media operation at rates up to 10 Gb/s, as well as proposed specifications for electrical media operation at rates greater than 10 Gb/s in the automotive environment. The number of cameras in vehicles is increasing as is the camera data rate with movement to higher resolution video. Optical data links are applicable to both the vehicle network backbone as well as connection of selected devices where location or other factors favor using an optical link.	Applications in automotive industries have begun the transition of legacy automotive networks to Ethernet to support Advanced Driver Assist Systems. This has generated a need for data rates greater than 1 Gb/s in the automotive environment. Optical fiber has been used in automotive applications both for Ethernet and other protocols. This project will complement both existing IEEE Std 802.3 Automotive Ethernet standards and ongoing projects using electrical and optical media. The project will provide increased data rates using graded-index plastic optical fiber media for operation in the automotive environment. The number of cameras in vehicles is increasing as is the camera data rate with movement to higher resolution video. Optical data links are applicable to both the vehicle network backbone as well as connection of selected devices where location or other factors favor using an optical link.
5.6 Stakeholders for the Standard	End-users, vendors, automotive Original Equipment Manufacturers, Tier x suppliers, system integrators, and providers of systems and components (e.g., sensors, actuators, test and measurement equipment, harnesses and harness components, software, silicon, and control units) for automotive applications.	As it is	As it is
6.1 Intellectual Property	6.1.1 Is the Standards Committee aware of any copyright permissions needed for this project? No 6.1.2 Is the Standards Committee aware of possible registration activity related to this project? No	As it is	As it is
7.1	Are there other standards or projects with a similar scope? No	As it is	As it is
7.2	Is it the intent to develop this document jointly with another organization? No	As it is	As it is
8.1 Additional Explanatory Notes	5.6 -- Tier x refers to the various levels of suppliers to Original Equipment Manufacturers (e.g., car manufacturer). A Tier 1 supplier for example supplies components or subsystems directly to the OEM.	5.2.b -- It became apparent to the IEEE 802.3 Working Group that the state of technology for graded-index glass and plastic fiber are different, and that a faster timeline for a graded-index glass fiber only project is achievable. 5.6 -- Tier x refers to the various levels of suppliers to Original Equipment Manufacturers (e.g., car manufacturer). A Tier 1 supplier for example supplies components or subsystems directly to the OEM.	5.3 -- IEC 60793-2-40 “Optical fibres – Part 2-40: Product specifications – Sectional specification for category A4 multimode fibres" 5.6 -- Tier x refers to the various levels of suppliers to Original Equipment Manufacturers (e.g., car manufacturer). A Tier 1 supplier for example supplies components or subsystems directly to the OEM.

A proposal for PAR splitting (Objectives)

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Bullet	802.3cz Current	802.3cz modified	802.3dh new
1	Preserve the IEEE 802.3/Ethernet frame format at the MAC client service interface	As it is	As it is
2	Preserve minimum and maximum frame size of the current IEEE 802.3 standard	As it is	As it is
3	Support full duplex operation only	As it is	As it is
4	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	As it is	As it is
5	Support data rates of 2.5 Gb/s, 5 Gb/s, 10 Gb/s, 25 Gb/s, and 50 Gb/s at the MAC/PLS service interface	As it is	Support data rates of 2.5 Gb/s, 5 Gb/s, 10 Gb/s, and 25 Gb/s~~, and 50 Gb/s~~ at the MAC/PLS service interface
6	Support optional Energy Efficient Ethernet optimized for automotive applications	As it is	As it is
7	Support operation in automotive environments (e.g., EMC, temperature)	As it is	As it is
8	Do not preclude meeting FCC and CISPR EMC requirements	As it is	As it is
9	Define the performance characteristics of an automotive link segment and an optical PHY to support 2.5 Gb/s point-to-point operation over this link segment supporting up to 4 inline connectors for at least 40 m on at least one type of automotive optical cabling	Define the performance characteristics of an automotive link segment and an optical PHY to support 2.5 Gb/s point-to-point operation over this link segment supporting up to 4 inline connectors for at least 40 m using graded-index glass optical fiber	Define the performance characteristics of an automotive link segment and an optical PHY to support 2.5 Gb/s point-to-point operation over this link segment supporting up to 3 inline connectors for at least 15 m using graded-index plastic optical fiber
10	Define the performance characteristics of an automotive link segment and an optical PHY to support 5 Gb/s point-to-point operation over this link segment supporting up to 4 inline connectors for at least 40 m on at least one type of automotive optical cabling	Define the performance characteristics of an automotive link segment and an optical PHY to support 5 Gb/s point-to-point operation over this link segment supporting up to 4 inline connectors for at least 40 m using graded-index glass optical fiber	Define the performance characteristics of an automotive link segment and an optical PHY to support 5 Gb/s point-to-point operation over this link segment supporting up to 3 inline connectors for at least 15 m using graded-index plastic optical fiber
11	Define the performance characteristics of an automotive link segment and an optical PHY to support 10 Gb/s point-to-point operation over this link segment supporting up to 4 inline connectors for at least 40 m on at least one type of automotive optical cabling	Define the performance characteristics of an automotive link segment and an optical PHY to support 10 Gb/s point-to-point operation over this link segment supporting up to 4 inline connectors for at least 40 m using graded-index glass optical fiber	Define the performance characteristics of an automotive link segment and an optical PHY to support 10 Gb/s point-to-point operation over this link segment supporting up to 3 inline connectors for at least 15 m using graded-index plastic optical fiber
12	Define the performance characteristics of an automotive link segment and an optical PHY to support 25 Gb/s point-to-point operation over this link segment supporting up to 4 inline connectors for at least 40 m on at least one type of automotive optical cabling	Define the performance characteristics of an automotive link segment and an optical PHY to support 25 Gb/s point-to-point operation over this link segment supporting up to 4 inline connectors for at least 40 m using graded-index glass optical fiber	Define the performance characteristics of an automotive link segment and an optical PHY to support 25 Gb/s point-to-point operation over this link segment supporting up to 2 inline connectors for at least 15 m using graded-index plastic optical fiber
13	Define the performance characteristics of an automotive link segment and an optical PHY to support 50 Gb/s point-to-point operation over this link segment supporting up to 2 inline connectors for at least 15 m on at least one type of automotive optical cabling	Define the performance characteristics of an automotive link segment and an optical PHY to support 50 Gb/s point-to-point operation over this link segment supporting up to 2 inline connectors for at least 40 m using graded-index glass optical fiber	Delete
14	Support a Bit Error Ratio better than or equal to 10-12 at the MAC/PLS service interface (or the frame loss ratio equivalent)	As it is	As it is

A proposal for PAR splitting (CSD)

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ernet interfaces in the target data rate range defined by this project will maintain a favora		802.3cz modified	802.3dh new
Managed Objects	Missing.	The definition of protocol independent managed objects, to be included in Clause 30 of IEEE Std 802.3, will be part of this project	The definition of protocol independent managed objects, to be included in Clause 30 of IEEE Std 802.3, will be part of this project
Coexistence	A CA document is not applicable because the proposed project is not a wireless project	As it is	As it is
Broad Market Potential	Broad sets of applicability. - Rapid growth of automotive Ethernet has placed high demand on the existing set of PHYs defined for the Automotive industry. Quantitative presentations have been made to the 802.3 OMEGA study group indicating significant market opportunity. - The increase of EMC issues due to the frequency increase of operation, and the galvanic isolation required in electrical vehicles is enabling the use of optical communications in the Automotive industry. The support of 40m distances makes optical an optimal solution for buses and trucks. - Several uses cases within the Automotive industry have been presented in the 802.3 OMEGA Study Group and CFI. - Other transport industries may benefit from these PHYs, for example trains, aircrafts, etc.	As it is	Broad sets of applicability. - Rapid growth of automotive Ethernet has placed high demand on the existing set of PHYs defined for the Automotive industry. Quantitative presentations have been made to the 802.3 OMEGA study group and 802.3cz task force indicating significant market opportunity. - The increase of EMC issues due to the frequency increase of operation, and the galvanic isolation required in electrical vehicles is enabling the use of optical communications in the Automotive industry. Reaches of at least 15 m makes optical fiber a viable solution for an Automotive Ethernet link. - Several uses cases within the Automotive industry have been presented in the 802.3 OMEGA Study Group and CFI. - Other transport industries may benefit from these PHYs, for example trains, aircrafts, etc.
	Multiple vendors and numerous users. In the CFI and the Study Group more than 40 individuals working for OEMs and TIER-1/2 suppliers have shown their support and interest. More than 90 Million cars are produced world wide annually. Many of them would benefit from Multi Gigabit Ethernet connectivity. More than 700 Million annual ports is the market size addressable by the PHYs expected to be defined by this project.	Multiple vendors and numerous users. There has been wide attendance and participation in the study group by subject matter experts familiar with the needs of end users, equipment manufacturers and component suppliers. It is anticipated that there will be sufficient participation to effectively complete the standardization process. More than 90 Million cars are produced world wide annually. Many of them would benefit from Multi Gigabit Ethernet connectivity. More than 700 Million annual ports is the market size addressable by the PHYs expected to be defined by this project.	Multiple vendors and numerous users. There has been wide attendance and participation in the study group by subject matter experts familiar with the needs of end users, equipment manufacturers and component suppliers. It is anticipated that there will be sufficient participation to effectively complete the standardization process. More than 90 Million cars are produced world wide annually. Many of them would benefit from Multi Gigabit Ethernet connectivity. More than 700 Million annual ports is the market size addressable by the PHYs expected to be defined by this project.
Compatibility	As a PHY amendment to IEEE Std 802.3, the proposed project will remain in conformance with IEEE Std 802, IEEE Std 802.1AC, and IEEE Std 802.1Q	As it is	As it is
	The proposed amendment will conform to the IEEE 802.3 MAC	As it is	As it is
	As with other IEEE 802.3 projects, a number of new PHY types will be defined	As it is	As it is
Distinct Identity	There is no IEEE 802.3 standard that supports optical Ethernet at rates greater than 1 Gb/s for the requirements of automotive applications	As it is	As it is
	The project may define multiple PHYs, but will define only a single PHY for each rate, media, and link reach combination	The project may define multiple PHYs, but will define only a single PHY for each rate and link reach using graded-index glass optical fiber	The project may define multiple PHYs, but will define only a single PHY for each rate and link reach using graded-index plastic optical fiber
Technical Feasibility	The proposed project will build on the array of Ethernet component and system design experience, and the broad knowledge base of Ethernet network operation	As it is	As it is
	Full-duplex operation over different optical fibers has been proven in deployments at multi gigabit rates	As it is	As it is
	Optical communications is already being successfully used in the automotive industry	As it is	As it is
	Reliability concerns have been covered by different analysis reported in the Study Group with a high degree of confidence	As it is	1 mm step-index plastic optical fiber has been used for data communications in automobiles for more than twenty years. It is expected that emerging graded-index plastic optical fiber will be similarly applicable to automotive networks. Reliability concerns have been covered by different analysis reported in the P802.3cz Task Force with a high degree of confidence
	Component vendors, including PHY vendors, fiber vendors and systems vendors have presented data on the feasibility of the necessary components for this project. Proposals which leverage existing technologies have been provided.	Component, including PHY, fiber and systems subject matter experts have presented data on the feasibility of the necessary components for this project. Proposals which leverage existing technologies have been provided.	Component, including PHY, fiber and systems subject matter experts have presented data on the feasibility of the necessary components for this project. Proposals which leverage existing technologies have been provided.
	Study group presentations support link budgets that fulfill automotive requirements at acceptable cost	As it is	As it is
Economic Feasibility	Ethernet interfaces in the target data rate range defined by this project will maintain a favorable cost-performance balance	As it is	As it is
	The balance of costs between infrastructure and attached stations is not applicable to the automotive environment	As it is	As it is
	The cost factors for Ethernet components and systems are well known. The proposed project may introduce new cost factors for automotive applications which can be quantified	As it is	As it is
	Prior experience in the development of other physical layer specifications for Ethernet indicates that the specifications developed by this project will result in a reasonable cost for the specified performance	As it is	As it is
	The reduction in the number of legacy networks requiring specialized components, expertise, and gateways in the targeted markets will result in a significant drop in both vehicle assembly (installation) and operational costs	As it is	As it is
	Overall costs are minimized by introducing Ethernet network architecture, management, and software into the automotive environment	As it is	As it is
	Zonal (centralized) architecture, connected car, and autonomous car, will allow consolidation of processing resources similar to what has been seen in enterprise networks	As it is	As it is
	The study group presentations support the possibility of technology leveraging of existing optical components for the automotive industry	As it is	The 802.3cz task force presentations support the possibility of technology leveraging of existing optical components for the automotive industry