
A Proposal to Modify the IEEE 802.3cz PAR

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Motivation for this contribution

- Four different PMDs have been proposed in IEEE 802.3cz
 - A solution based on OM3 laser optimized multimode optical fiber operating at 980nm
 - Technically complete
 - Meets all objectives
 - Addresses all CSD responses
 - 980nm has proven reliability advantages
 - A solution based on OM3 laser optimized multimode optical fiber operating over a 850 to 980nm wavelength range
 - It is believed that a single transmitter specification cannot be used due to reliability concerns
 - 980nm VCSEL can have a > 7mA bias current and still meet reliability requirements
 - 850nm VCSEL must have a < 5mA bias current to marginally meet reliability requirements
 - Results in a 2.5dB reduction in link budget that must be compensated for
 - A solution based on OM3 laser optimized multimode optical fiber operating at 1300nm
 - Is not proposed to support all objectives
 - Lacks distinct identity – same data rate and same link length as 980nm proposal
 - Proponents of OM3 at 1300nm claim better reliability than 980nm but no data has been presented to support this claim
 - Is on a different timeline for a technically complete draft
 - A solution based on Graded-Index Plastic Optical Fiber
 - Does not address all of our objectives
 - Does not meet our commitments to IEEE 802 in our CSD responses
 - Is on a different timeline for a technically complete draft

Motivation for this contribution (cont.)

- At the November 8, 2021 802.3 Opening Plenary, the current status of P802.3cz was reported
 - D1.2 in preparation, December 7, 2021 target for availability
 - Still deadlocked on PMD baseline
 - Exploring possibilities for breaking deadlock (e.g., revise Objectives and/or CSD, “PAR split”)
- Two contributions have been developed to support breaking the deadlock in IEEE 802.3cz
 - Contribution 1 provides a side-by-side comparison of a split PAR
 - Proposed modifications to IEEE 802.3cz Objectives and new IEEE 802.3dh Objectives
 - Proposed modifications to IEEE 802.3cz PAR and a new IEEE 802.3dh PAR
 - Proposed modifications to IEEE 802.3cz CSD responses and new IEEE 802.3dh CSD responses
 - Contribution 3 provides a proposal for a modified PAR IEEE 802.3cz based on graded-index glass optical fiber only

Intent

- It is believed that the 980nm OM3 proposal has been properly vetted in the TF and is ready to move to WG ballot in March 2022
- It is believed that all of the other proposal have shortcomings
 - Each has specific issues in addressing CSD requirements for Broad Market Potential, Technical Feasibility, Economic Feasibility and Distinct Identity
- This contribution
 - Proposes a revised PAR based on graded-index glass optical fiber
 - The CSD responses are not changed
 - The objectives are revised to support 2.5, 5, 10, 25 and 50Gb/s point-to-point operation over this link segment supporting up to 4 inline connectors for at least 40 m at 980nm using graded-index glass optical fiber
- This contribution
 - Does not address 850-980nm broadband solutions
 - Does not address 1300nm solutions

IEEE 802.3cz PAR modifications

Submitter Email: (automatically completed)

Type of Project: Amendment to IEEE Standard 802.3-2018

Project Request Type: **Modify / Amendment**

PAR Request Date:

PAR Approval Date:

PAR Expiration Date: **PAR Status:** Active **Draft**

Root PAR: P802.3-2018

1.1 Project Number: P802.3cz

1.2 Type of Document: Standard

1.3 Life Cycle: Full Use

2.1 Project Title: Standard for Ethernet

Amendment: Physical Layer Specifications and Management Parameters for Multi-Gigabit Optical Automotive Ethernet

IEEE 802.3cz PAR modifications (cont.)

3.1 Working Group: Ethernet Working Group(C/LM/802.3 WG)

3.1.1 Contact Information for Working Group Chair:

Name: David Law

Email Address: (automatically completed)

3.1.2 Contact Information for Working Group Vice Chair:

Name: Adam Healey

Email Address: (automatically completed)

3.2 Society and Committee: IEEE Computer Society/LAN/MAN Standards Committee(C/LM)

3.2.1 Contact Information for Standards Committee Chair:

Name: Paul Nikolich

Email Address: (automatically completed)

3.2.2 Contact Information for Standards Committee Vice Chair:

Name: James Gilb

Email Address: (automatically completed)

3.2.3 Contact Information for Standards Representative:

Name: James Gilb

Email Address: (automatically completed)

4.1 Type of Ballot: Individual

4.2 Expected Date of submission of draft to the IEEE SA for Initial Standards Committee Ballot: **November 2022**

4.3 Projected Completion Date for Submittal to RevCom: ~~Oct 2022~~ **June 2023**

IEEE 802.3cz PAR modifications (cont.)

5.1 Approximate number of people expected to be actively involved in the development of this project: 40

5.2.a Scope of the complete standard: This standard defines Ethernet local area, access and metropolitan area networks. Ethernet is specified at selected speeds of operation; and uses a common media access control (MAC) specification and management information base (MIB). The Carrier Sense

Multiple Access with Collision Detection (CSMA/CD) MAC protocol specifies shared medium (half duplex) operation, as well as full duplex operation. Speed specific Media Independent Interfaces (MIIs) provide an architectural and optional implementation interface to selected Physical Layer entities (PHY). The Physical Layer encodes frames for transmission and decodes received frames with the modulation specified for the speed of operation, transmission medium and supported link length. Other specified capabilities include: control and management protocols, and the provision of power over selected twisted pair PHY types.

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 **using graded-index glass optical fiber** for application in the automotive environment

5.3 Is the completion of this standard contingent upon the completion of another standard? No

5.4 Purpose: This document will not include a purpose clause

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.

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.

IEEE 802.3cz PAR modifications (cont.)

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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

7.1 Are there other standards or projects with a similar scope? No

7.2 Is it the intent to develop this document jointly with another organization? No

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.

Proposed Objectives

IEEE 802.3cz modified objectives

- 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 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 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 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 50 Gb/s point-to-point operation over this link segment supporting up to 2 inline connectors for at least **40 m**
~~15 m~~ on at least one type of automotive optical cabling

Thanks for your attention