IEEE 802.3 10SPE Multidrop Enhancements (SPMD) Study Group Opening Report

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Teleconference

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IEEE 802.3 SPMD Study Group
Study Group information

Study Group Organization

- Chad Jones IEEE 802.3 SPMD Study Group Chair
- Peter Jones, Ad Hoc Chair

Study Group charter

- Move that the IEEE 802.3 WG form a study group to develop a PAR and CSD for “10SPE Multidrop Enhancements”

Study Group web and reflector information

- Reflector information: http://www.ieee802.org/3/SPMD/reflector.html
- Home page: http://ieee802.org/3/SPMD/index.html
- Private area: http://ieee802.org/3/SPMD/private/index.html

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IEEE 802.3 SPMD Study Group

Pre-submitted documents – PAR, CSD, Objectives

PAR: https://mentor.ieee.org/802-ec/dcn/20/ec-20-0012-01-00EC-ieee-p802-3da-draft-par-response.pdf

CSD: https://mentor.ieee.org/802-ec/dcn/20/ec-20-0013-00-00EC-ieee-p802-3da-draft-csd-response.pdf

Objectives: http://www.ieee802.org/3/SPMD/spmd_objectives.pdf

All documents were pre-submitted on Feb 15, 2020

IEEE P802.3da DRAFT Objectives

1. Define performance characteristics of a mixing segment for 10Mb/s multidrop single balanced pair networks supporting up to at least 16 nodes, for up to at least 50m reach.
2. Maintain a bit error ratio (BER) at the MAC/PLS service interface of less than or equal to 10^{-10} on the new mixing segment.
3. Specify an optional PLCA node ID allocation method
4. Support interoperability with Clause 147 multidrop
5. Support optional Time Synchronization Service Interface (TSSI)
6. Select a single MDI connector

IEEE P802.3da DRAFT Objectives

7. Specify improvements for Energy Efficient Ethernet compared to current 10Mb/s multidrop single balanced pair networks
8. Support operation in the noise environments for building, industrial, and transportation applications
9. Specify optional plug-and-play power distribution over the mixing segment
10. PSE shall only energize the mixing segment when at least one PD is connected
11. Support addition and removal of a node or set of nodes to a continuously operating powered mixing segment

WG Motion

Move that the IEEE 802.3 Working Group approve the IEEE P802.3da objectives http://www.ieee802.org/3/SPMD/spmd_objectives.pdf

with modification as detailed on slide 5 of 802d3_SPMD_update_study_group_report_0520a.pdf

M: Chad Jones

S: Heath Stewart

P802.3da PAR (changes)

P802.3da

Submitter Email:
Type of Project: Amendment to IEEE Standard 802.3-2018 **Project Request Type:** Initiation / Amendment
PAR Request Date:
PAR Approval Date:
PAR Expiration Date:
PAR Status: Draft
Root Project: 802.3-2018

1.1 Project Number: P802.3da **1.2 Type of Document:** Standard **1.3 Life Cycle:** Full Use

2.1 Project Title: IEEE Standard for Ethernet
Amendment: Physical Layer Specifications and Management Parameters for Enhancement of 10 Mb/s Operation over Single Balanced Pair Multidrop Segments ~~Enhancements~~

P802.3da PAR (changes)

3.1 Working Group: Ethernet Working Group(C/LM/WG802.3) **3.1.1 Contact Information for Working Group Chair:**

Name: David Law

Email Address: david_law@ieee.org

3.1.2 Contact Information for Working Group Vice Chair:

Name: Adam Healey

Email Address: adam.healey@broadcom.com

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: p.nikolich@ieee.org

3.2.2 Contact Information for Standards Committee Vice Chair: Name: James Gilb
Email Address: gilb@ieee.org

3.2.3 Contact Information for Standards Representative: Name: James Gilb
Email Address: gilb@ieee.org

P802.3da PAR (changes)

3.1 Working Group: Ethernet Working Group(C/LM/WG802.3) **3.1.1 Contact Information for Working Group Chair:**

Name: David Law

Email Address: david_law@ieee.org
3.1.2 Contact Information for Working Group Vice Chair:

Name: Adam Healey

Email Address: adam.healey@broadcom.com
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: p.nikolich@ieee.org

3.2.2 Contact Information for Standards Committee Vice Chair: Name: James Gilb
Email Address: gilb@ieee.org

3.2.3 Contact Information for Standards Representative: Name: James Gilb
Email Address: gilb@ieee.org

4.1 Type of Ballot: Individual
4.2 Expected Date of submission of draft to the IEEE SA for Initial Standards Committee Ballot: Nov 2022
4.3 Projected Completion Date for Submittal to RevCom: Aug 2023

P802.3da PAR (changes)

5.1 Approximate number of people expected to be actively involved in the development of this project: 30

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.

P802.3da PAR (changes)

5.2.b Scope of the project: Specify additions and modifications of the Physical Layer (including reconciliation sublayers), management parameters, Ethernet support for time synchronization protocols, and optional power delivery supporting multiple powered devices on the 10Mb/s mixing segment. ~~to enhance 10Mb/s multidrop single balanced pair networks~~

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: Many applications in building, industrial, and transportation industries have begun the transition from legacy non-Ethernet networks to Ethernet. A number of these applications require enhancements to 10Mb/s multidrop single balanced pair networks, e.g., larger multidrop topologies, power delivery, TSSI (Time Synchronization Service Interface). These enhancements will increase the applications addressed by this technology.

P802.3da PAR (changes)

5.6 Stakeholders for the Standard: End-users, vendors, system integrators, and providers of systems and components (e.g., sensors, actuators, instruments, controllers, elevator systems, HVAC systems, lighting systems, network infrastructure, security systems, user interfaces) for building (commercial and residential), industrial, and transportation (e.g. automotive, trains/trams) sectors.

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 :

WG Motion

Move that the IEEE 802.3 Working Group approve the IEEE P802.3da PAR https://mentor.ieee.org/802-ec/dcn/20/ec-20-0012-01-00EC-ieee-p802-3da-draft-par-response.pdf with modification as detailed on slides 7 and 11 of 802d3_SPMD_update_study_group_report_0520a.pdf

M: Chad Jones

S: George Zimmerman

Technical >=75%

Managed Objects

Describe the plan for developing a definition of managed objects. The plan shall specify one of the following:

a) The definitions will be part of this project.
b) The definitions will be part of a different project and provide the plan for that project or anticipated future project.
c) The definitions will not be developed and explain why such definitions are not needed.

The definition of protocol independent managed objects will be part of this project.

In addition, it is expected that the protocol-specific definition of managed objects will be added in a future amendment to an IEEE 802.3 Standard for Management

Coexistence

A WG proposing a wireless project shall demonstrate coexistence through the preparation of a Coexistence Assurance (CA) document unless it is not applicable.

a) Will the WG create a CA document as part of the WG balloting process as described in Clause 13?

b) If not, explain why the CA document is not applicable

- A CA document is not applicable because the proposed project is not a wireless project.

Broad Market Potential

Each proposed IEEE 802 LMSC standard shall have broad market potential. At a minimum, address the following areas:

a) Broad sets of applicability.

b) Multiple vendors and numerous users.

Broad Sets of Applications:

Many applications in building, industrial, and transportation sectors have begun the transition from legacy non-Ethernet networks to Ethernet. A number of these applications require enhancements to 10Mb/s multidrop single balanced pair networks, e.g., larger multidrop topologies, power delivery, and Ethernet support for time synchronization protocols.

These enhancements will increase the applications addressed by this technology.

Multiple vendors and numerous users:

At the Call for Interest, 57 individuals from 38 organizations indicated they would support this project. These included companies from industrial automation, building automation, automotive, automotive OEMs, silicon, infrastructure, cabling, connector, and test equipment vendors.

Substantial Market Potential:

Data presented indicates substantial market potential in a number of the possible applications. Examples in industrial automation include the total low voltage contactor and overload protection device 2020 market projections exceeding 426 million nodes. Examples in building automation include intelligent lighting where global lighting node shipments are expected to exceed 210 million by 2021, elevators where the number of nodes would exceed 30 million annually and HVAC systems where the number of nodes would exceed 66 million annually by 2021.

Compatibility

Each proposed IEEE 802 LMSC standard should be in conformance with IEEE Std 802, IEEE 802.1AC, and IEEE 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1 WG prior to submitting a PAR to the Sponsor.

a) **Will the proposed standard comply with IEEE Std 802, IEEE Std 802.1AC and IEEE Std 802.1Q?**
b) **If the answer to a) is "no", supply the response from the IEEE 802.1 WG.**
c) **Compatibility with IEEE Std 802.3**
d) **Conformance with the IEEE Std 802.3 MAC**

As a Physical Layer and powering 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 an amendment to IEEE Std 802.3, new physical layer and powering specifications will be defined for 10Mb/s multidrop single balanced pair networks.

By utilizing the existing IEEE Std802.3 MAC protocol, this proposed amendment will maintain maximum compatibility with the installed base of Ethernet nodes.

The proposed amendment will conform to the IEEE 802.3 MAC as defined in Clause 4 of IEEE Std 802.3-2018.

Distinct Identity

Each proposed IEEE 802 LMSC standard shall provide evidence of a distinct identity. Identify standards and standards projects with similar scopes and for each one describe why the proposed project is substantially different.

Substantially different from other IEEE 802.3 specifications / solutions.

There is no IEEE 802.3 standard for 10Mb/s multidrop single balanced pair networks that supports power delivery or enables Ethernet support for time synchronization protocols.

The project will specify or modify a single Physical Layer.

The project will modify one or more IEEE Std 802.3 RS (Reconciliation Sublayer) clauses (e.g. Clause 90, Clause 148).

The project will specify optional power delivery supporting multiple powered devices on the mixing segment.

Technical Feasibility

Each proposed IEEE 802 LMSC standard shall provide evidence that the project is technically feasible within the time frame of the project. At a minimum, address the following items to demonstrate technical feasibility:

a) Demonstrated system feasibility.
b) Proven similar technology via testing, modeling, simulation, etc.
c) Confidence in reliability.

The proposed project will build on the array of Ethernet component and system design experience, and the broad knowledge base of Ethernet network operation.

Multi-drop Ethernet over a single balanced pair of conductors has been proven both technically and operationally under IEEE Std 802.3cg-2019.

Multiple vendors have presented technical approaches for providing power over a mixing segment.

Component vendors, including IC vendors, cabling 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.

The reliability of Ethernet components and systems can be projected in the target environments with a high degree of confidence.

Economic Feasibility

Each proposed IEEE 802 LMSC standard shall provide evidence of economic feasibility. Demonstrate, as far as can reasonably be estimated, the economic feasibility of the proposed project for its intended applications. Among the areas that may be addressed in the cost for performance analysis are the following:

a) Balanced costs (infrastructure versus attached stations).
b) Known cost factors.
c) Consideration of installation costs.
d) Consideration of operational costs (e.g., energy consumption).
e) Other areas, as appropriate.

The 10 Mb/s Single Pair Ethernet multidrop interface defined by this project will maintain a favorable cost balance for applications operating over a single balanced pair (multidrop) mixing segment.

As a Physical Layer and powering project, it will maintain the balance of costs for infrastructure vs. attached stations.

The cost factors for Ethernet components and systems are well known. The proposed project may introduce new cost factors which can be quantified.

Prior experience in the development of the IEEE Std 802.3cg-2019 10BASE-T1S indicates that the specifications developed by this project will entail a reasonable cost for the resulting performance.

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 installation and operational costs.

Overall costs are minimized by introducing Ethernet network architecture, management, and software into the target environments.

WG Motion

Move that the IEEE 802.3 Working Group approve the IEEE P802.3da 10SPE Multidrop Enhancements CSD “Managed Objects”, “Coexistence”, “Broad Market Potential”, “Compatibility”, “Distinct Identity”, “Technical Feasibility”, and “Economic Feasibility” responses, as per https://mentor.ieee.org/802-ec/dcn/20/ec-20-0013-00-00EC-ieee-p802-3da-draft-csd-response.pdf with modification as detailed on slide 16 of 802d3_SPMD_update_study_group_report_0520a.pdf

M: Chad Jones

S: Bob Voss

Technical >=75%

Questions?

Thank you!