

Proposed CSD responses for 400GPL Study Group

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IEEE 802.3 Criteria for Standards Development (CSD)

The IEEE 802 Criteria for Standards Development (CSD) are defined in Clause 14 of the IEEE 802 LAN/MAN Standards Committee (LMSC) Operations Manual. The criteria include project process requirements (“Managed Objects”) and 5 Criteria (5C) requirements. The 5C are supplemented by subclause 4.5 ‘Criteria for Standards Development’ of the ‘IEEE 802.3 Ethernet Working Group Operations Manual’.

The following are the CSD Responses in relation to the IEEE P802.3dv PAR

Items required by the IEEE 802 CSD are shown in Black text and supplementary items required by IEEE 802.3 are shown in **blue** text.

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, to be included in Clause 30 of IEEE Std 802.3, will be part of this project.

Coexistence

A WG proposing a wireless project shall prepare a Coexistence Assessment (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? (yes/no)
- b) If not, explain why the CA document is not applicable.

- No. 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.**
- The principle of building equipment that supports IEEE 802.3 networks operating at different Ethernet rates has been amply demonstrated by a broad set of product offerings.
 - Per contributions to the IEEE 802.3 New Ethernet Applications Industry Connections “Ethernet for AI” Assessment, networks that enable the scaling of Artificial Intelligence / Machine-learning (AI/ML) infrastructure deployment require high radix, high bandwidth interconnections. The traditional Ethernet data center application use case can also leverage high radix, high bandwidth interconnections.
 - the definition of interfaces based on 400 Gb/s/lane signaling will address the bandwidth density, cost, and power requirements of these markets.
 - The evolving needs of aggregating computing devices will be addressed by physical layers based on 400 Gb/s/lane data rates that enable higher radix interconnections with greater aggregate bandwidth connectivity.
 - There has been wide attendance and participation in both the study group and the IEEE 802.3 New Ethernet Applications Industry Connections “Ethernet for AI” Assessment 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.

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 an amendment to IEEE Std 802.3 the proposed project shall comply with IEEE Std 802, IEEE Std 802.1AC and IEEE Std 802.1Q.
- As was the case in previous IEEE Std 802.3 amendments, new physical layers will be defined for 400 Gb/s, 800 Gb/s, and 1.6 Tb/s operation.
- As an amendment to IEEE Std 802.3, the proposed project will conform to the full-duplex operating mode of the IEEE 802.3 MAC.
- By utilizing the existing IEEE Std 802.3 MAC protocol, this proposed amendment will maintain compatibility with the installed base of Ethernet nodes.
- The definition of protocol independent managed objects, to be included in Clause 30 of IEEE Std 802.3, will be part of this project.

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.

- ❑ The proposed amendment will be the first IEEE 802.3 standard defining 400 Gb/s, 800 Gb/s, and 1.6 Tb/s Ethernet physical layer specifications based on 400 Gb/s/lane electrical and optical signaling technologies.

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 principle of building equipment that supports IEEE 802.3 networks operating at different Ethernet rates has been amply demonstrated by a broad set of product offerings.
 - IEEE 802.3 has already established 400 Gb/s, 800 Gb/s and 1.6 Tb/s Media Access Control (MAC) specifications suitable for 400 Gb/s/lane Physical Layer operation in previous IEEE 802.3 projects.
 - The proposed project will build on the array of Ethernet component and system design experience, and the broad knowledge base of Ethernet network operation.
 - Contributions have been made (in the Study Group and in the IEEE 802.3 New Ethernet Applications Industry Connections “Ethernet for AI” Assessment) that presented data on 400 Gb/s/lane signaling technologies over copper and single-mode fiber. Proposals, which either leverage existing technologies or employ new technologies, have been provided.
 - For 400 Gb/s/lane electrical and optical signaling some combination of the following approaches could include pulse-amplitude modulation, equalization techniques, and forward error correction.
 - Based on prior experience with developing higher speed solutions, the reliability of Ethernet components and systems is understood and 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) Known cost factors.
 - b) Balanced cost factors.
 - c) Consideration of installation costs.
 - d) Consideration of operational costs (e.g., energy consumption).
 - e) Other areas, as appropriate.
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- Prior experience scaling IEEE 802.3 indicates the cost distribution between compute devices, switches, routers, and the infrastructure will remain acceptably balanced for 400 Gb/s, 800 Gb/s, and 1.6 Tb/s Ethernet.
 - The cost factors for Ethernet components and systems are well known. The proposed project may introduce new cost factors which are understood and can be quantified.
 - The deployment of 400 Gb/s, 800 Gb/s and 1.6 Tb/s Ethernet standards based on 400 Gb/s/lane signaling will result in optimizations that will allow economies of scale to reduce cost for all solutions.
 - In consideration of installation costs, the project is expected to use proven and familiar media.
 - Network design, installation and maintenance costs are minimized by preserving network architecture, management, and software.
 - In consideration of operational costs associated with power consumption, the project will examine alternatives that trade off physical layer complexity, power, latency, and implementation constraints.