

# Proposed Changes to PAR / 5C

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# Introduction

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- P802.3bj voted to change the scope of the PAR to include 100GBASE-CR10, 40GBASE-CR4, and 40GBASE-KR4
  - The scope of this project is to specify additions to and appropriate modifications of IEEE Std 802.3 to add 100 Gb/s 4 lane Physical Layer (PHY) specifications and management parameters for operation on backplanes and twinaxial copper cables, and specify optional Energy Efficient Ethernet (EEE) for 40 Gb/s and 100 Gb/s operation over backplanes and copper cables.
- P802.3bj voted to add two objectives to cover PHYs listed above
  - To define optional Energy-Efficient Ethernet operation for 100GBASE-CR10
  - To define optional Energy-Efficient Ethernet operation for 40GBASE-CR4 and 40GBASE-KR4
- PAR Changes
  - P802.3bj voted to change par scope / objectives
  - Related Item - The 802 EC changed Compatibility criterion in March
- Critter Changes?
  - Based on new PAR scope / Objectives
  - Based on new Compatibility criterion

# Compatibility (old)

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- **IEEE 802 defines a family of standards. All standards should be in conformance with the IEEE 802.1 Architecture, Management, and Interworking documents as follows: IEEE 802. Overview and Architecture, IEEE 802.1D, IEEE 802.1Q, and parts of IEEE 802.1F. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1.**
- **Each standard in the IEEE 802 family of standards shall include a definition of managed objects that are compatible with systems management standards.**
- **I. Compatibility with IEEE Std 802.3**
- **II. Conformance with the IEEE Std 802.3 MAC**
- **III. Managed object definitions compatible with SNMP**

# Compatibility (new)

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- IEEE 802 LMSC defines a family of standards. All standards should be in conformance : IEEE Std 802, IEEE 802.1D, and IEEE 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1 Working Group. In order to demonstrate compatibility with this criterion, the Five Criteria statement must answer the following questions.
  - a) Does the PAR mandate that the standard shall comply with IEEE Std 802, IEEE Std 802.1D and IEEE Std 802.1Q?
  - b) If not, how will the Working Group ensure that the resulting draft standard is compliant, or if not, receives appropriate review from the IEEE 802.1 Working Group

# Proposed Changes

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- Add to PAR in “Notes” see par\_01\_0712.pdf
- Review critters
  - Changes resulting from PAR change
  - Change from 802 EC Change of Critters

# IEEE 802.3 Five Criteria

The IEEE 802 Criteria for Standards Development (Five Criteria) are defined in subclause 12.5 of the 'IEEE project 802 LAN/MAN Standards Committee (LMSC) operations manual'. These are supplemented by subclause 7.2 'Five Criteria' of the 'Operating Rules of IEEE Project 802 Working Group 802.3, CSMA/CD LANs'.

# Broad Market Potential

A standards project authorized by IEEE 802 LMSC shall have a broad market potential.

Specifically, it shall have the potential for:

- a) **Broad sets of applicability.**
  - b) **Multiple vendors and numerous users.**
  - c) **Balanced costs (LAN versus attached stations).**
- Ethernet has become widely deployed as a preferred backplane solution. Examples include Modular Servers and Enterprise and Telecom Network Equipment. Ethernet is also widely deployed over twinaxial copper cables for both intra-rack and inter-rack connections.
  - Internet, cloud, and higher performance computing applications, along with advances in processors, server virtualization and converged networking, are driving the need for higher bandwidth blade and rack server connections. Increasing the backplane data rate to 100 Gb/s and providing cost effective 100 Gb/s rack server solutions are required to maintain pace with new demands.
  - 120 participants attended the “100 Gb/s Ethernet Electrical Backplane and Twinaxial Copper Cable Assemblies” Call-For-Interest, representing at least 43 companies. This level of interest indicates that a standard will be developed by a large group of vendors and users.
  - A 100 Gb/s Ethernet interface will maintain a favorable cost balance for backplane and twinaxial copper cable applications.
  - **Energy Efficient Ethernet will reduce the operational costs and the environmental footprint of Ethernet Systems.**

# Compatibility

- IEEE 802 LMSC defines a family of standards. All standards should be in conformance : IEEE Std 802, IEEE 802.1D, and IEEE 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1 Working Group. In order to demonstrate compatibility with this criterion, the Five Criteria statement must answer the following questions. Each standard in the IEEE 802 family of standards shall include a definition of managed objects that are compatible with systems management standards.
  - a) Does the PAR mandate that the standard shall comply with IEEE Std 802, IEEE Std 802.1D and IEEE Std 802.1Q?
  - b) If not, how will the Working Group ensure that the resulting draft standard is compliant, or if not, receives appropriate review from the IEEE 802.1 Working Group
- **Compatibility with IEEE Std 802.3**
- **Conformance with the IEEE Std 802.3 MAC**
- **Managed object definitions compatible with SNMP**
- **The P802.3bj PAR mandates that the amendment shall comply with IEEE Std 802, IEEE Std 802.1D and IEEE Std 802.1Q.**
- As an amendment to IEEE Std 802.3, as amended by IEEE Std 802.3ba-2010, the proposed project will remain in conformance with ~~the IEEE 802 Overview and Architecture, the bridging standards IEEE Std 802.1D and IEEE Std 802.1Q, and~~ clause 80 introduced by IEEE Std 802.3ba-2010.
- The proposed amendment will conform to the full-duplex operating mode of the IEEE 802.3 MAC.
- The proposed amendment will conform to **the 40 Gb/s and 100 Gb/s Media Independent Interfaces (XLGMII, CGMII) specified by IEEE Std 802.3ba-2010 with optional additions for Energy Efficient Ethernet.**
- The project will include a protocol independent specification of managed objects with SNMP management capability to be provided in the future by an amendment to or revision of IEEE P802.3.1.



# Distinct Identity

Each IEEE 802 LMSC standard shall have a distinct identity. To achieve this, each authorized project shall be:

- a) Substantially different from other IEEE 802 standards.
  - b) One unique solution per problem (not two solutions to a problem).
  - c) Easy for the document reader to select the relevant specification.
  - d) Substantially different from other IEEE 802.3 specifications/solutions.
- There is no standard that supports Ethernet on backplane media at operating speeds of 100 Gb/s. While IEEE Std 802.3ba-2010 does include a specification for 100 Gb/s Ethernet on twinaxial copper cables (100GBASE-CR10) the cables are bulky and relatively costly due to the fact that they are constructed with twenty twinaxial wire pairs.
  - The standard will define at most one PHY for each medium.
  - The proposed amendment to the existing IEEE 802.3 standard will be formatted as a collection of new clauses, making it easy for the reader to select the relevant specification.
  - IEEE Std 802.3 does not define Energy Efficient Ethernet for 40 Gb/s or 100 Gb/s operation

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- For Discussion:
- The standard will define at most one PHY for each medium.
- Suggestion:
- The standard will define at most one PHY for twinaxial copper cables, one PHY as an upgrade path for 40 Gb/s applications targeting existing channel loss specifications within IEEE Std 802.3 and another PHY for next generation backplane media with a reduced insertion loss.

# Technical Feasibility

For a project to be authorized, it shall be able to show its technical feasibility. At a minimum, the proposed project shall show:

- a) **Demonstrated system feasibility.**
  - b) **Proven technology, reasonable testing.**
  - c) **Confidence in reliability.**
- Systems with an aggregate bandwidth of greater than or equal to 100 Gb/s have been demonstrated and deployed in operational networks.
  - The proposed project will build on the array of Ethernet component and system design experience, and the broad knowledge base of Ethernet network operation.
  - Component vendors have presented data on the feasibility of the necessary components for this project. Proposals, which either leverage existing technologies or employ new 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

For a project to be authorized, it shall be able to show economic feasibility (so far as can reasonably be estimated) for its intended applications. At a minimum, the proposed project shall show:

- a) Known cost factors, reliable data.
  - b) Reasonable cost for performance.
  - c) Consideration of installation costs.
- 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 backplane and twinaxial physical layer specifications for Ethernet indicates that the specifications developed by this project will entail a reasonable cost for the resulting performance.
  - 100 Gb/s backplane and twinaxial copper links will make it possible to achieve the desired density, power and cost targets for computer systems and network equipment.
  - In consideration of installation costs, the project is expected to use proven and familiar media, including electrical backplanes, and twinaxial copper cabling technology.
  - Network design, installation and maintenance costs are minimized by preserving network architecture, management, and software.

# Recommendations

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- Approve Change to par (par\_01\_0712.pdf)
- Approve Critter changes noted on Slide 6 (Broad Market Potential), Slide 7 (Compatibility), and Slide 8 (Distinct Identity)
- Consider for approval suggested change to Distinct Identity response on Slide 10.
- Move that the Task Force:
  - Submit the project documentation (PAR, 5C, Objectives) to the 802.3 Working Group for approval.
  - Request that the 802.3 Working Group chair pre-submit the PAR to the 802 Executive Committee for consideration at the Nov 2012 Plenary Session.