

# Proposed 5C Responses

## NGBASE-T SG Ad Hoc Working Session

David Chalupsky, Intel Corporation

IEEE 802.3 Next Generation BASE-T Study Group  
January 2013  
Phoenix, AZ

Items required by the IEEE 802 five criteria are shown in Black text, supplementary items required by IEEE 802.3 are shown in Blue text.

# NGBT 5C Ad Hoc Overview

---

- Responses to the 5 Criteria (5C) must be completed by the Study Group before it can progress to a Task Force.
- Ad hoc chartered by the SG chair to work on the 5C response (Jan 22, 2013).
- This deck is proposed draft 5C response... a starting point to be worked by the ad hoc.
- Goal is to have 5 Criteria responses approved by the Study Group at this meeting.
- Some of the responses cannot be finalized until we adopt objectives.
  - Responses drafted in context of the current direction and focus of SG, trending to 20m-30m reach.
- Note: page 1 & 2 (this page!) are not part of the 5C response; remove before approving.

# 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'.

The following are the Five Criteria Responses in relation to the IEEE P802.3bq PAR:

Items required by the IEEE 802 five criteria are shown in Black text, supplementary items required by IEEE 802.3 are shown in Blue text.

# 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).** [Removed from IEEE 802 5 criteria 11/12]**

- Ethernet has become widely deployed as a preferred networking solution for Internet service provider, cloud, computing and storage applications ranging from small business to large enterprise. Increased network traffic in these applications driven by server virtualization and converged networking is driving the need for higher bandwidth server connections. Increasing the data rate for the BASE-T family of PHYs will help meet this demand.
- Ethernet BASE-T interfaces have been particularly suited for heterogeneous environments with a mixed set of applications, equipment and networking port speeds. The ability to migrate to higher speeds of operation on an as-needed basis, while maintaining compatibility with existing equipment, is appealing to a wide field of users.
- 112 individuals attended the “Next Generation BASE-T” Call For Interest, indicating a wide interest in the topic. 51 people representing 29 companies indicated they would contribute to the project.
- A higher speed BASE-T will take advantage of cost effective twisted pair cabling and the advances in silicon process geometry to provide a balanced cost between LAN and the attached stations. Balanced cost is achieved by supporting both point to point and structured cabling environments in Top of Rack and End of Row topologies that are widely deployed in today’s data center.

# 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**
- As an amendment to IEEE Std 802.3, the proposed project will remain in conformance with the IEEE 802 Overview and Architecture, and bridging standards IEEE Std 802.1D and IEEE Std 802.1Q.
- As an amendment to IEEE Std 802.3-2012 the proposed project will remain in accordance with IEEE Std 802.3 clause 80, “Introduction to 40Gb/s and 100Gb/s networks.”
- 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 Media Independent Interface XLGMII specified by IEEE Std 802.3-2012 , and will extend clause 28 autonegotiation and Energy Efficient Ethernet to support the new PHY.
- 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 Std 802.3.1.

# 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 over structured twisted pair cabling at a data rate of 40Gb/s. The IEEE P802.3bq project will define a single 40Gb/s PHY over twisted pair cabling.
  - The proposed amendment to the existing IEEE 802.3 standard will be formatted as a new clause, making it easy for the reader to select the relevant specification.

# 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.**
- Component and cabling vendors have presented data indicating that 40Gb/s operation over twisted pair cabling is feasible with known techniques similar to those used in existing BASE-T standards. Presentations have provided analyses of PHY feasibility based on measurements of installed cabling and proposed new cabling types from TIA and ISO/IEC aimed at this application. Project objectives for distance have been chosen to balance feasibility, power, and broad market potential.
  - Systems and infrastructure supporting Ethernet operation over twisted pair cabling have been deployed by the hundreds of millions at speeds ranging from 10Mb/s to 10Gb/s. The proposed project will build on Ethernet component and system design experience and the broad knowledge base of Ethernet network operation.
  - 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 BASE-T Ethernet components and cabling are well known and are extensible with high confidence.
  - Prior experience in the development of twisted pair physical layer specifications for Ethernet indicates that the specifications developed by this project will entail a reasonable cost for the target performance.
  - The widespread use and low cost of installation of structured twisted pair cabling systems supports economic feasibility with regards to total cost of installation.
  - Network design, installation and maintenance costs are minimized by preserving network architecture, management, and software.



# Additional page

---