Next-Generation BASE-T Study Group Closing Report

IEEE 802.3 Ethernet Working Group

Bill Woodruff, Broadcom, Chair

David Chalupsky, Intel, Vice Chair

Orlando, Florida

March 21, 2013

Reflector and Web

- To subscribe to the Next Generation BASE-T reflector, send an email to:

  ListServ@ieee.org

  with the following in the body of the message (do not include "<>"):

  subscribe **NGBASE-T** ***<yourfirstname> <yourlastname>***

  end

- Send NGBASE-T reflector messages to:

  STDS-802-3-NGBASET*@listserv.ieee.org*

- Study Group web page URL:

  http://www.ieee802.org/3/NGBASET/

Study Group Private Area

- URL: http://www.ieee802.org/3/NGBASET/private/index.html
  - Username:
  - Password:

- Write it down…

- Note - The content is posted for your review only, and neither the content nor access information should be copied or redistributed to others in violation of document copyrights.

This Week's Progress

- ~30 attendees; 2-day meeting
- Heard 4 presentations
- Developed and approved response to TIA liaison letters, posted to SG website
- Modification to Objectives (posted)
- Modification to PAR in response to comment from EC member (posted)
- No change to 5C
- Passed motion to request 802.3 to extend Study Group

SG Motion #3

- **Change the words “channel model” to “link segment” in the objectives beginning “Define a channel model” and “Define a single 40Gb/s PHY”**
- (technical >=75%)

M: G Zimmerman

S: C DiMinico

Y: 32

N: 0

A: 1

Motion passes

Next Generation BASE-T Objectives

- Support full duplex operation only
- Preserve the 802.3 / Ethernet frame format utilizing the 802.3 MAC
- Preserve minimum and maximum Frame Size of current 802.3 standard
- Support a BER better than or equal to 10^{-12} at the MAC/PLS service interface
- Support Auto-Negotiation (Clause 28)
- Support Energy Efficient Ethernet (Clause 78)
- Support local area networks using point-to-point links over structured cabling topologies, including directly connected link segments
- Do not preclude meeting FCC and CISPR EMC requirements
- Support a data rate of 40 Gb/s at the MAC/PLS Service Interface
- Define a ~~channel model~~ link segment based upon copper media specified by ISO/IEC JTC1/SC25/WG3 and TIA TR42.7 meeting the following characteristics:
  - 4-pair, balanced twisted-pair copper cabling
  - up to 2 connectors
  - up to at least 30 m
- Define a single 40 Gb/s PHY supporting operation on the ~~channel model~~ link segment

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.

SG Motion #5

- Move that NGBASE-T Study Group chair submit the following motion to the IEEE 802.3 Working Group:
  - Move that the IEEE 802.3 approve the text in ngbt_tia_liaison_response_0313.pdf, with editorial license granted to the chair (or his appointed agent), as a liaison communication from the IEEE 802.3 Working Group to TIA.

M: Dave Chalupsky

S: Keith Kosanovich

Procedural, 50%

Y: 30 N: 0 A: 2

Motion passes

Liaison Response

- http://ieee802.org/3/NGBASET/public/mar13/ngbt_tia_liaison_response_0313.pdf

SG Motion #6

- Change PAR section 4.2 expected date of submission of draft to the IEEE-SA for Initial Sponsor Ballot from 09/2015 to 08/2015 or earlier, with license to 802.3 WG Vice Chair or his delegate to implement as allowed by the PAR tool.
- (technical >=75%)

M: David Chalupsky

S: Wayne Larsen

Y: 27

N: 0

A: 3

Motion passes

Draft PAR (IEEE P802.3bq)

- http://ieee802.org/3/NGBASET/P802_3bq_PAR_Detail_20_03_2013.pdf

WG Motion

Move that IEEE 802.3 approve the text in ngbt_tia_liaison_response_03132.pdf, with editorial license granted to the Chair (or his appointed agent), as a liaison communication from the IEEE 802.3 Working Group to TIA.

Moved by Bill Woodruff on behalf of the Study Group

2nd – N/A

Technical >=75%

Yes: No: Abstain:

WG Motion

- Approve the IEEE P802.3bq 40GBASE-T Project Objectives

Moved by Bill Woodruff

2nd – David Chalupsky

Technical, >=75%

Yes: No: Abstain:

WG Motion

- Approve the IEEE P802.3bq 40GBASE-T response to the Broad Market Potential criterion

Moved by Bill Woodruff

2nd – David Chalupsky

Technical, >=75%

Yes: No: Abstain:

WG Motion

- Approve the IEEE P802.3bq 40GBASE-T response to the Compatibility criterion

Moved by Bill Woodruff

2nd – David Chalupsky

Technical, >=75%

Yes: No: Abstain:

WG Motion

- Approve the IEEE P802.3bq 40GBASE-T response to the Distinct Identity criterion

Moved by Bill Woodruff

2nd – David Chalupsky

Technical, >=75%

Yes: No: Abstain:

WG Motion

- Approve the IEEE P802.3bq 40GBASE-T response to the Technical Feasibility criterion

Moved by Bill Woodruff

2nd – David Chalupsky

Technical, >=75%

Yes: No: Abstain:

WG Motion

- Approve the IEEE P802.3bq 40GBASE-T response to the Economic Feasibility criterion

Moved by Bill Woodruff

2nd – David Chalupsky

Technical, >=75%

Yes: No: Abstain:

WG Motion

- Approve the IEEE P802.3bq 40GBASE-T PAR

Moved by Bill Woodruff

2nd – David Chalupsky

Technical, >=75%

Yes: No: Abstain:

WG Motion

- Move that IEEE 802.3 extend the Next Generation BASE-T Study Group

Moved by Bill Woodruff on behalf of the Study Group

2nd – N/A

>50%

Yes: No: Abstain:

Thank You!