



IEEE 802.3
Higher Speed Study Group
Thursday Discussions & Motions

Ottawa, ON, Canada
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Straw Polls – 40km Reach Objective

- Straw Poll #3: The HSSG has demonstrated technical feasibility for a 40 km SMF PMD at 100 Gb/s. (All: 50 / 0 / 10)
- Straw Poll #4: The HSSG has demonstrated economic feasibility for a 40 km SMF PMD at 100 Gb/s. (All: 35 / 1 / 24)
- Straw Poll #5: Does the HSSG believe that the 40km reach objective should be added to HSSG PAR A? (All: 48 / 1 / 15)

Motion # 1

- Move the HSSG add the 40km reach objective to PAR A
 - Support at least 40km on SMF

- Moved by – Joel Goergen
- Second by – Chris Cole
- Technical ($\geq 75\%$)

- All Yes - 49 No - 1 Abstain - 11
- 802.3 Yes - 22 No - 1 Abstain - 7
- Motion Passes

Straw Polls – Copper Objective

- Straw Poll #6: Does the HSSG believe that there is broad market potential for a copper solution to support up to 10m reach @ 100 Gb/s? (All: 55 / 0 / 9)
- Straw Poll #7: Should the HSSG adopt the following objective for 100 Gb/s - “Support up to 10m using copper media (not backplane).” (All: 51 / 0 / 12)
- Straw Poll #8: The HSSG has demonstrated technical feasibility for a copper solution to support up to 10m reach @ 100 Gb/s. (All: 44 / 3 / 18)
- Straw Poll #9: The HSSG has demonstrated economic feasibility for a copper solution to support up to 10m reach @ 100 Gb/s. (All: 38 / 3 / 21)
- Straw Poll #10: Does the HSSG believe that the Cu reach objective should be added to HSSG PAR A? (All: 35 / 2 / 23)

Motion # 2

- Move that the HSSG adopt an objective
 - to support at least 10m over a copper cable assembly

- Moved by – Chris Di Minico
- Second by – Joel Goergen
- Technical ($\geq 75\%$)

- All Yes - 51 No - 0 Abstain - 15
- 802.3 Yes - 23 No - 0 Abstain - 7
- Motion Passes

Motion # 3

- Move that the HSSG include the copper objective, “to support at least 10m over a copper cable assembly,” into PAR A.
- Moved by – Chris Di Minico
- Second by – Joel Goergen
- Technical ($\geq 75\%$)
- All Yes - 47 No - 0 Abstain - 22
- 802.3 Yes - 20 No - 0 Abstain - 11
- Motion Passes

Straw Polls – 40G MAC Rate

- Straw Poll #1 - Does the HSSG believe that there is broad market potential for 40 GbE (in addition to 100GbE)? (All: 24 / 24 / 26)
- Straw Poll #2 - Should the HSSG adopt the following objective - “Support a speed of 40 Gb/s at the MAC/PLS service interface.” (All: 22 / 24 / 24)



Straw Poll #11 (Requested by Howard Frazier)

- A standard for higher speed Ethernet should specify
 - A. 100 Gbps operation only
 - B. 40 Gbps operation & 100 Gbps operation
 - C. No Opinion

Results

A - 27

B - 26

C - 14

Straw Poll #13 (requested by Joel Goergen)

- If a 40G objective is to happen, should it be included in:
 - a) PAR A
 - b) Separate HSSG PAR
 - c) A separate SG effort

Results

- a. 28
- b. 16
- c. 16

Straw Poll #14 (Requested by Mike Dudek)

- Should the 100G PAR A (including objectives approved at this meeting) be delayed due to lack of consensus on an additional 40G MAC Rate Option?

Results

- Yes - 0
- No - 39

HSSG Objectives

- Support full-duplex operation only (approved 11/16/06: All 73/0/4)
- Preserve the 802.3 / Ethernet frame format at the MAC Client service interface (approved 11/16/06: All 76/0/4)
- Preserve minimum and maximum FrameSize of current 802.3 Std (approved 11/16/06: All 74/0/4)
- Support a speed of 100 Gb/s at the MAC/PLS interface (approved 11/16/06: All 67/9/14, 802.3 26/4/11)
- Support at least 10km on SMF. (approved 11/16/06: All 86/0/4, 802.3 40/0/4)
- Support at least 100 meters on OM3 MMF. (approved 11/16/06, All 61/3/27, 802.3 33/2/13)
- Support a BER better than or equal to 10^{-12} at the MAC /PLS service interface. (approved 1/19/07, All 68/0/4).
- Support at least 40-km on SMF. (approved 1/19/07, All 38/10/32, 802.3 12/6/16).
- To support at least 10m over a copper cable assembly (approved 4/19/07, All 51/0/15, 802.3 23/0/7)

Updated Apr 19, 2007

HSSG PAR “A” Objectives

- Support full-duplex operation only (approved 11/16/06: All 73/0/4)
- Preserve the 802.3 / Ethernet frame format at the MAC Client service interface (approved 11/16/06: All 76/0/4)
- Preserve minimum and maximum FrameSize of current 802.3 Std (approved 11/16/06: All 74/0/4)
- Support a speed of 100 Gb/s at the MAC/PLS interface (approved 11/16/06: All 67/9/14, 802.3 26/4/11)
- Support at least 10km on SMF. (approved 11/16/06: All 86/0/4, 802.3 40/0/4)
- Support at least 100 meters on OM3 MMF. (approved 11/16/06, All 61/3/27, 802.3 33/2/13)
- Support a BER better than or equal to 10^{-12} at the MAC /PLS service interface. (approved 1/19/07, All 68/0/4).
- Support at least 40-km on SMF. (approved 1/19/07, All 38/10/32, 802.3 12/6/16).
- To support at least 10m over a copper cable assembly (approved 4/19/07, All 51/0/15, 802.3 23/0/7)

Updated Apr 19, 2007

HSSG “PAR A” (Working Draft)

■ Title -

- IEEE Standard for Information Technology - Telecommunications and Information Exchange Between Systems - Local and Metropolitan Area Networks – Specific Requirements Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications – Amendment: Media Access Control Parameters, Physical Layers and Management Parameters for 100 Gb/s Operation
- Confirmed by voice vote without objection

HSSG “PAR A” (Working Draft)

■ Scope –

- Define 802.3 Media Access Control (MAC) parameters, physical layer specifications, and management parameters for the transfer of 802.3 format frames at 100 Gb/s.
- Confirmed as modified by voice vote without objection

HSSG “PAR A” (Working Draft)

■ Purpose

- The purpose of this project is to extend the 802.3 protocol to an operating speed of 100 Gb/s in order to provide a significant increase in bandwidth while maintaining maximum compatibility with the installed base of 802.3 interfaces, previous investment in research and development, and principles of network operation and management. The project is to provide for the interconnection of equipment satisfying the distance requirements of the intended applications.
- Confirmed by voice vote without objection

HSSG “PAR A” Working Draft

- **Need –**
 - **The project is necessary to provide a solution for applications that have been demonstrated to need bandwidth beyond the existing capabilities. These include data center, internet exchanges, high performance computing and video on demand delivery.**
 - **Confirmed by voice vote without objection**

Broad Market Potential (PAR A Working Draft)

- **Broad sets of applications**
 - **Multiple vendors and numerous users**
 - **Balanced cost (LAN versus attached stations)**
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- Rapid growth of network and internet traffic has placed high demand on the existing infrastructure motivating the development of higher performance links. Quantitative presentations have been made to the IEEE 802.3 HSSG indicating significant market need for 100 Gb/s Ethernet across a wide range of applications.
- 100 Gb/s IEEE 802.3 provides a solution for applications that have been demonstrated to need bandwidth beyond existing capabilities. Examples include: providing interconnect for switch / routing and aggregation capabilities in data centers, internet exchanges and service provider peering points; serving growth applications such as video on demand and high performance computing environments.
- There has been wide attendance and participation across end users, equipment manufacturers and component suppliers. It is anticipated that there will be sufficient participation to effectively complete the standardization process.
- Prior experience scaling IEEE 802.3 across the range of 1 to 10000 Mb/s indicates that the cost distribution between routers, switches, and the infrastructure remains acceptably balanced. 100 Gb/s Ethernet should continue this trend in the intended higher end application spaces.
- Given the topologies of the networks and intended applications, the early deployment will be driven by key aggregation & high-bandwidth interconnect points. This is unlike the higher volume end system application typical for 10/100/1000 Mb/s Ethernet, and as such, the initial volumes for 100 Gb/s Ethernet are anticipated to be more modest than the lower speeds. This does not imply a reduction in the need or value of 100 Gb/s Ethernet to address the stated applications.
- Confirmed as modified by voice vote without objection.

Compatibility (PAR A Working Draft)

- IEEE 802 defines a family of standards. All standards shall be in conformance with the IEEE 802.1 Architecture, Management, and Interworking documents as follows: 802. Overview and Architecture, 802.1D, 802.1Q, and parts of 802.1f. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with 802. Each standard in the IEEE 802 family of standards shall include a definition of managed objects that are compatible with systems management standards.
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- As an amendment to IEEE Std 802.3, the proposed project will remain in conformance with the IEEE 802 Overview and Architecture as well as the Bridging standards IEEE Std 802.1D and IEEE Std 802.1Q.
- As an amendment to IEEE Std 802.3, the proposed project will follow the existing format and structure of IEEE 802.3 MIB definitions providing a protocol independent specification of managed objects (IEEE Std 802.1F).
- The proposed standard will conform to the full-duplex operating mode of the IEEE 802.3 MAC, appropriately adapted for 100 Gb/s operation.
- As was the case in previous IEEE 802.3 standards, new physical layers will be defined for 100 Gb/s operation.
- Confirmed by voice vote without objection

Distinct Identity (PAR A Working Draft)

- Substantially different from other IEEE 802 standards
 - One unique solution per problem (not two solutions to a problem)
 - Easy for the document reader to select the relevant specification
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- The proposed standard is an upgrade path for IEEE 802.3 users, based on the IEEE 802.3 MAC, running at 100 Gb/s.
- By adapting the existing IEEE 802.3 MAC protocol for use at 100 Gb/s, this proposed standard will maintain maximum compatibility with the installed base of Ethernet nodes.
- The established benefits of the IEEE 802.3 MAC include:
 - Deterministic, highly efficient full-duplex operation mode
 - Well-characterized and understood operating behavior
 - Broad base of expertise in suppliers and customers
 - Straightforward bridging between networks at different data rates
- The Management Information Base (MIB) for IEEE 802.3 will be extended in a manner consistent with the IEEE 802.3 MIB for 10 / 100 / 1000 / 10000 Mb/s operation.
- The proposed standard will be an amendment to the existing IEEE 802.3 standard, formatted as a collection of new clauses, making it easy for the reader to select the relevant specification.
- Confirmed as modified by voice vote without objection

Technical Feasibility (PAR A Working Draft)

- **Demonstrated system feasibility**
 - **Proven technology, reasonable testing**
 - **Confidence in reliability**
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- The proposed project will build on the array of Ethernet component and system design experience, and the broad knowledge base of Ethernet network operation.
- The principle of scaling the IEEE 802.3 MAC to higher speeds has been well established by previous work within IEEE 802.3. This 100 Gb/s project will build on this experience.
- The principle of building bridging equipment which performs rate adaptation between IEEE 802.3 networks operating at different speeds has been amply demonstrated by the broad set of product offerings that bridge between 10, 100, 1000, and 10000 Mb/s.
- Component vendors have presented data on the feasibility of the necessary components for 100 Gb/s Ethernet. Proposals, which either leveraged existing technologies or employed new innovative technologies, have been provided.
- The reliability of Ethernet components and systems can be extrapolated in the target environments with a high degree of confidence. Presentations demonstrating this have been provided.
- Confirmed by voice vote without objection

Economic Feasibility (PAR A Working Draft)

- Known cost factors, reliable data
 - Reasonable cost for performance
 - Consideration of installation costs
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- The cost factors for Ethernet components and systems are well known. The proposed project may introduce new cost factors which can be quantified.
- Representations from component and equipment suppliers and their customers indicate that Ethernet at 100 Gb/s will offer better value and lower cost than alternate approaches or technologies.
- Customers will be able to use the SMF and OM3 fiber defined and installed in accordance with existing standards.
- Customers will be able to use copper cable assemblies specified for very short reach applications.
- Installation costs for new fiber runs based on established standards are well known and reasonable.
- Network design, installation and maintenance costs are minimized by preserving network architecture, management, and software.
- Confirmed as modified by voice vote without objection.