IEEE 802.3
25 Gb/s Ethernet over a single lane for server interconnect Study Group

Opening Plenary Report

San Antonio, Tx

Nov 3-7th, 2014

Mark Nowell, Chair

Study Group Scope
(as per July 2014 Plenary Motion)

Request that the IEEE 802.3 WG form a study group to develop a PAR and CSD for:

25 Gigabit/s Ethernet over a single lane for server interconnects

M: Mark Nowell

S: Howard Frazier

Procedural (>50%)

Y: 61 N: 0 A: 5

25Gb/s Ethernet Study group organization

- Chair: Mark Nowell, Cisco
- Recording Secretary: Kent Lusted, Intel
- Editor: Matt Brown, APM
- Ad hoc chairs:
  - Optical: Jonathan King, Finisar
  - Architecture, Matt Brown, APM

Reflector and Web

- To subscribe to the 25Gb/s Ethernet Study Group reflector, send an email to:

  ListServ@ieee.org

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

  subscribe **stds-802-3-25G** **<*yourfirstname*>** **<*yourlastname*>**

  end

- Send 25Gb/s Ethernet reflector messages to:

  stds-802-3-25G@listserv.ieee.org

- Study Group web page URL:

  http://www.ieee802.org/3/25GSG/index.html

Topics

- September Interim meeting update
  - Meeting Progress
  - Objectives
  - CSD
  - PAR
- Activities this week

Kanata Interim meeting report

- Sept 11&12th 2014, Kanata, Ont
  - Hosted by Ericsson

- 102 attendees
- 13 presentations.
- Rapid progress – strong consensus due to significant technology leverage and industry interest in moving forward.
- 3 Straw polls, 15 motions
  - SG adopted objectives, CSD responses and PAR.

- 5 ad hoc meetings since the interim meeting
  - 10+ presentations

25 Gb/s Ethernet Sept Interim Meeting summary

- Excellent progress:
  - Full set of objectives adopted
  - All Criteria for Standards Development responses completed and adopted
  - Project Authorization Request completed and adopted
- Congratulations to the study group for excellent use of ad hocs to enable discussion and build consensus
  - *Unanimous* motions throughout SG meeting!!

Objectives adopted by Study Group

- Support a MAC data rate of 25 Gb/s
- Support full-duplex operation only
- Preserve the Ethernet frame format utilizing the Ethernet MAC
- Preserve minimum and maximum FrameSize of current IEEE 802.3 standard
- Support a BER of better than or equal to 10^{-12} at the MAC/PLS service interface (or the frame loss ratio equivalent)
- Support optional Energy-Efficient Ethernet operation

Y:83 N:0 A:1

- Define a single-lane 25 Gb/s PHY for operation over a printed circuit board backplane consistent with channels specified in IEEE Std 802.3bj-2014 Clause 93 *Y:74 N:0 A:3*
- Define a single-lane 25 Gb/s PHY for operation over links consistent with copper twin axial cables, with lengths up to at least 3m *Y:62 N:0 A:14*
- Define a single-lane 25 Gb/s PHY for operation over links consistent with copper twin axial cables, with lengths up to at least 5m *Same motion as 3m objective*
- Define a single-lane 25 Gb/s PHY for operation over MMF consistent with IEEE P802.3bm Clause 95 *Y:75 N:0 A:3*
- Provide appropriate support for OTN *Y:71 N:0 A:9*

CSD responses

- All CSD responses adopted
- See http://www.ieee802.org/3/25GSG/25GE_CSD_0914_adopted.pdf

  - Managed Objects *Y:63 N:0 A:0*
  - Coexistence *Y:61 N:0 A:1*
  - Broad Market Potential *Y:72 N:0 A:0*
  - Compatibility *Y:62 N:0 A:0*
  - Distinct Identity *Y:62 N:0 A:0*
  - Technical Feasibility *Y:75 N:0 A:0*
  - Economic Feasibility *Y:71 N:0 A:0*

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.
- In addition it is expected that the definition of Simple Network Management Protocol (SNMP) managed objects, written using the Structure of Management Information version 2 (SMIv2), and making reference to the protocol independent managed objects provided by this project, will be added in a future amendment to, or revision of, IEEE Std 802.3.1 IEEE Standard for Management Information Base (MIB) Definitions for Ethernet.

Coexistence

A WG proposing a wireless project shall demonstrate coexistence through the preparation of a Coexistence Assurance (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?

b) If not, explain why the CA document is not applicable

- 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.

- Ethernet is widely deployed for server to switch applications in data centers. An Ethernet data rate of 25 Gb/s enables a cost effective interconnect solution enabling 25 Gb/s server solutions and intersecting the 100Gb/s networking solutions based on 25 Gb/s SerDes technology.

- There will be a significant market potential for 25 Gb/s Ethernet interfaces on servers that optimize the total cost of ownership while meeting the necessary IO bandwidth requirements in data centers.

- 148 participants attended the “25 Gb/s Ethernet over a single lane for server interconnect ” Call-For-Interest. 59 individuals representing at least 36 companies indicated that they would support the standardization process. It is anticipated that there will be sufficient participation to effectively complete the standardization process including representatives from end-users, equipment manufacturers and component suppliers.

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

e) Managed object definitions compatible with SNMP

- 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, this 25 Gb/s amendment will define new physical layers.
- As an amendment to IEEE Std 802.3, the proposed amendment will conform to the full-duplex operating mode of the IEEE 802.3 MAC.
- By using the existing IEEE Std 802.3 MAC protocol, the proposed amendment will maintain compatibility with the installed base of Ethernet nodes.
- 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 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 operating at a 25 Gb/s MAC rate.
- There are no existing standards, or projects developing standards, addressing the specification of 25 Gb/s Ethernet.

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.

- Systems based upon 25 Gb/s technology have been 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 technology at 25 Gb/s, developed for both IEEE P802.3bj and IEEE P802.3bm, are available and in production.
- The reliability of components for 25 Gb/s Ethernet has been established 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) Balanced costs (infrastructure versus attached stations).
b) Known cost factors.
c) Consideration of installation costs.
d) Consideration of operational costs (e.g., energy consumption).
e) Other areas, as appropriate.

- The cost factors for Ethernet components and systems are well known.
- Prior experience in the development of 25 Gb/s technology for Ethernet establishes that the specifications developed by this project will entail a reasonable cost for the resulting performance.
- 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.
- A 25 Gb/s Ethernet interface will maintain a favorable cost balance between the server and the switch.
- Energy Efficient Ethernet will reduce the operational costs and the environmental footprint.

Project Authorization Request

- PAR form was edited “live” and pdf was generated and adopted
- See http://www.ieee802.org/3/25GSG/25GE_PAR_final_110914.pdf
  - Motion to adopt passed*: Y:53 N:0 A:0*

Project Authorization Request

2.1 Title: Standard for Ethernet Amendment: Media Access Control Parameters, Physical Layers and Management Parameters for 25 Gb/s Operation

5.2.b. Scope of the project: Define Ethernet Media Access Control (MAC) parameters, physical layer specifications, and management parameters for the transfer of Ethernet format frames at 25 Gb/s for server to switch interconnections.

5.5 Need for the Project: There is a need for greater than 10 Gb/s Ethernet connectivity for server to switch connections. The availability of 25 Gb/s signaling technologies enables interconnect solutions for server to switch applications to be developed which are lower cost than existing 40 Gb/s Ethernet solutions.

5.6 Stakeholders for the Standard: Stakeholders identified to date include, but are not limited to, users and producers of systems and components for data centers.

Plans for this week

- Meet Tues & Wed Bowie B conf room
  - Tues 8:30am-5:30pm & Wed 8:00am - ~9:00am
- @ Study Group
  - Review set of objectives for the project
  - Review responses for the CSD (Criteria for Standards Development)
  - Review PAR
  - Review presentations towards developing Task Force proposals
  - ** Review feedback from other 802 WG and respond and adopt any changes ** (editorial feedback received already from Jon Rosdahl – 802.11 WG Chair)

- @ 802.3 Working Group Closing Plenary
  - Adopt 25GbE Study Group Objectives, CSD and PAR

Thank you