25 Gb/s Ethernet Over Single-Mode Fiber Study Group: status and work

David Lewis - Lumentum
Acting Study Group Chair

Ad hoc meeting 12/9/15

Topics

- CFI recap
- Study Group expectations
  - Study Group work
  - Potential Objectives
  - Potential CSD responses
- Ad hoc work

Consensus Building Presentation

Met Tuesday evening during plenary week from 8-9pm

- 113 people in the room at time of count

- Presenter and expert panel
  – David Lewis – Lumentum
  – Kohichi Tamura – Oclaro
  – Peter Jones – Cisco
  – David Malicoat – HPE
  – Paul Kolesar - Commscope

- The presentation discussed the motivation and needs for 25 Gb/s Ethernet Over Single-Mode Fiber for next generation enterprise and metro access applications:
  – http://www.ieee802.org/3/cfi/1115_2/CFI_02_1115.pdf

Straw Polls & Motions

At Consensus Building Meeting:

1. Should a study group be formed for "25 Gigabit/s Ethernet PMD(s) for single mode fiber"? Y: 102 N: 0 A: 3

2. Individuals participation: 66

3. Company participation: 48

CFI Motion @ Nov Closing Plenary

- Move that the IEEE 802.3 WG form a study group to develop a PAR and CSD for:
"25 Gigabit/s Ethernet PMD(s) for single mode fiber"

Moved: David Lewis
Seconded: Kohichi Tamura

Procedural (> 50%)

Yes: _68_   No: _0__   Abstain: _4__

Study Group Work

- Goal of a Study Group is to study the problem and develop the following:
  - Objectives
  - Responses to The Criteria for Standard Development (CSD) – aka 5 Criteria
  - PAR
- Solving the problem, developing solutions, writing specifications are all Task Force activities

Goal of both Study Groups

- Very well supported CFI
- Very strong consensus on need to get things moving
  - Justification was built around maximizing re-use of technology developed for 100 GbE and 25 GbE
- Opportunity to move fast through Study Group phase
- One Ad hoc chartered:
  - Study Group ad hoc – Chair: To Be Announced soon

Study Group Ad hoc

25 Gb/s SMF Study Group ad hoc charter:

- to discuss the different areas of work that will fall under the work of the study group and to prepare content and contributions towards the study group's goal of developing the required documentation of objectives, PAR and CSD.

Some logistics…

Webpages:

25 Gb/s SMF Ethernet Study Group

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

Reflector:

- Subscribe or unsubscribe using the link on the study group web page (above)

9

25 Gb/s SMF Draft Objectives (Foundational)

- 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 Frame Size 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

25 Gb/s SMF Draft Objectives (TBD by adhoc)

- Use only existing electrical and logical interfaces from IEEE Std 802.3 as modified by IEEE P802.3by
- Provide Physical Layer specification which support 25 Gb/s operation over at least 10 km on SMF.
- Provide Physical Layer specification which support 25 Gb/s operation over at least 40 km on SMF.

Other potential 25GSMF Draft Objectives

- Provide appropriate support for OTN

25 Gb/s SMF Draft CSD responses

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**

- N/A since this 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 access switch to switch applications in enterprise applications. As access switch downlink speeds increase from 1 Gb/s to 2.5 Gb/s the corresponding uplink speeds will increase from 10 Gb/s to 25 Gb/s. This higher speed is needed throughout the enterprise / campus network, including for reaches greater than those developed in 802.3by.

- In metropolitan networks the core operates at 100 Gb/s and requires tributary feeds at rates higher than 10 Gb/s. The natural next step is to 25 Gb/s which matches the per-lane rate of several 100 Gb/s PMDs used for these networks.

- 113 participants attended the "25 Gb/s SMF Ethernet PMD" Call-For-Interest. 66 individuals representing at least 48 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 as amended by the IEEE P802.3by project, 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 P802.3ba.

- As an amendment to IEEE 802.3by, the proposed project will follow the existing format and structure of IEEE 802.3 MIB definitions by providing a protocol-independent specification of managed objects. The MDIO interface is expected to be a strict subset of what is specified in IEEE P802.3by for 25GBASE-SR.

- Utilizing the same MAC, PCS, and PMA as 25GBASE-SR, the new PMD(s) maintain the same relationship to IEEE Std 802.3 as IEEE P802.3by 25 Gb/s PMDs.

- The proposed amendment will conform to the full-duplex operating mode of the IEEE 802.3 MAC.

- 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 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.

There is no standard that supports Ethernet over single-mode fiber cabling at a data rate of 25 Gb/s. The proposed project will define one or more 25 Gb/s PMD for single-mode fiber cabling.

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.**

- Component vendors are currently delivering 100 Gb/s PMDs organized as 25 Gb/s per lane including: 100GBASE-LR4 and 100GBASE-ER4. Subcomponents from these PMDs as well as other 100 Gb/s technologies can be re-used for the proposed 25 Gb/s single mode PMD(s).

- Other standards bodies including ITU-T are standardizing 100 Gb/s PMD profiles based on 100 Gb/s CWDM technology. Subcomponents from those PMDs can also be re-used for 25 Gb/s PMDs.

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 100 Gb/s technology specifications for Ethernet establishes that the new 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.

- Energy Efficient Ethernet will reduce the operational costs and the environmental footprint.

Future 25GSMF Ad hoc work

- Review contributions aimed at locking down objectives
- Prepare content and contributions to substantiate:
  - Technical feasibility
  - Economic Feasibility
  - Broad Market Potential
  - Distinct Identity
  - Compatibility
- Future meetings: 12/16, 12/23, 12/30, 1/6, 1/13 (as needed)