400 Gb/s Ethernet Technical Feasibility Response Proposal

Steve Trowbridge, Alcatel-Lucent

Technical Feasibility Related Presentations – 1/2

gustlin_400_01b_0513.pdf	Logic
nishimura_400_01a_0513.pdf	Electrical Connectors
holden_400_01_0513.pdf	*Electrical Signaling*
bugg_400_01_0513.pdf	*Copper Cable*
diab_400_01b_0713.pdf	EEE
gustlin_400_02_0713.pdf	Logic
zhai_400_01_0713.pdf	FEC
wang_400_01_0713.pdf	FEC
vijn_400_01a_0713.pdf	*NA*
holden_400_01_0713.pdf	*Backplane*
jewell_400_01a_0713.pdf	MMF
tanaka_400_01a_0913.pdf	SMF (DMT)
takahara_400_01a_0913.pdf	SMF (DMT)

Note: Presentations not related to adopted objectives shown in *italics*

Technical Feasibility Related Presentations – 2/2

holden_400_01_0913.pdf	*Backplane*
jewell_400_01_1113.pdf	MMF
palkert_400_01_1113.pdf	*Backplane/Twinax*
palkert_400_02_1113.pdf	SMF (500M)
chen_400_01_1113.pdf	SMF (advanced modulation)
cole_400_01a_1113.pdf	SMF (duplex architectures)
CFI_01_0313.pdf	Slides 25-38
gustlin_hse_01_0912.pdf	PCS feasibility
cui_hse_01a_0912.pdf	Impracticality of 1Tb/s (why 400Gb/s)
anslow_400_02_1113.pdf	BER
trowbridge_400_01_0713.pdf	OTN Support
dambrosia_400_01_0913.pdf	Attachment Unit Interface

Note: Presentations not related to adopted objectives shown in *italics*

Objectives

- Support a MAC data rate of 400 Gb/s ☑
- Support a BER of better than or equal to 10^{-13} at the MAC/PLS service interface (or the frame loss ratio equivalent) ☑
- Support full-duplex operation only
- Preserve the Ethernet frame format utilizing the Ethernet MAC
- Preserve minimum and maximum FrameSize of current Ethernet standard
- Provide appropriate support for OTN ☑
- Specify optional Energy Efficient Ethernet (EEE) capability for 400 Gb/s PHYs ☑
- Support optional 400 Gb/s Attachment Unit Interfaces for chip-to-chip and chip-to-module applications ☑
- Provide physical layer specifications which support link distances of:
  - At least 100 m over MMF ☑
  - At least 500 m over SMF ☑
  - At least 2 km over SMF ☑
  - At least 10 km over SMF ☑

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. [Removed from IEEE 802 CSD Nov 2013]

- The principle of scaling the IEEE 802.3 MAC to higher speeds has been well established by previous work within IEEE.
- 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 and100 Mb/s and 1, 10, 40, and 100 Gb/s.
- Systems with an aggregate bandwidth of greater than or equal to 400 Gb/s have been demonstrated and 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.
  - The experience gained in the development and deployment of 40 and 100 Gb/s technology is applicable to the development of specifications for components at higher speeds. For example, parallel transmission techniques and forward error correction for high rate interfaces allow reuse of 40 and 100 Gb/s technology and testing
  - Component vendors have presented data on the feasibility of the necessary components for higher speed solutions. Proposals, which either leverage existing technologies or employ new technologies, have been provided.
- The reliability of Ethernet components and systems can be projected in the target environments with a high degree of confidence. Presentations demonstrating this have been provided.