

# 400 Gb/s Ethernet Technical Feasibility ad hoc – Proposed Responses

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# Technical Feasibility ad hoc Report

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- Ad hoc materials at:  
[http://ieee802.org/3/400GSG/public/adhoc/tech\\_feas/index.shtml](http://ieee802.org/3/400GSG/public/adhoc/tech_feas/index.shtml)
- One conference call held January 7, 2014 considering one presentation
- Several edits were made during the call to the proposed response, and participants were invited to inform the ad hoc chair if they wished to be listed as a supporter of the resulting Technical Feasibility response

# Supporters

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Ghani Abbas (Ericsson)

Pete Anslow (Ciena)

Brad Booth (Microsoft)

Ali Ghiasi (Independent)

Mark Gustlin (Xilinx)

Tom McDermott (Fujitsu)

David Lewis (JDSU)

Paul Mooney (Spirent)

Tom Palkert (Molex, Luxtera)

Randy Rannow (API Chip)

Jeff Slavick (Avago)

Xiaolu Song (Huawei)

Peter Stassar (Huawei)

Brian Teipen (ADVA Optical)

Alan Tipper (Semtech)

Nathan Tracy (TE Connectivity)

Steve Trowbridge (Alcatel-Lucent)

Alex Umnov (Fujitsu)

# Technical Feasibility Related Presentations – 1/2

<a href="#">gustlin_400_01b_0513.pdf</a>	Logic
<a href="#">nishimura_400_01a_0513.pdf</a>	Electrical Connectors
<a href="#">holden_400_01_0513.pdf</a>	<i>Electrical Signaling</i>
<a href="#">bugg_400_01_0513.pdf</a>	<i>Copper Cable</i>
<a href="#">diab_400_01b_0713.pdf</a>	EEE
<a href="#">gustlin_400_02_0713.pdf</a>	Logic
<a href="#">zhai_400_01_0713.pdf</a>	FEC
<a href="#">wang_400_01_0713.pdf</a>	FEC
<a href="#">vijn_400_01a_0713.pdf</a>	NA
<a href="#">holden_400_01_0713.pdf</a>	<i>Backplane</i>
<a href="#">jewell_400_01a_0713.pdf</a>	MMF
<a href="#">tanaka_400_01a_0913.pdf</a>	SMF (DMT)
<a href="#">takahara_400_01a_0913.pdf</a>	SMF (DMT)

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

# Technical Feasibility Related Presentations – 2/2

<a href="#">holden_400_01_0913.pdf</a>	<i>Backplane</i>
<a href="#">jewell_400_01_1113.pdf</a>	MMF
<a href="#">palkert_400_01_1113.pdf</a>	<i>Backplane/Twinax</i>
<a href="#">palkert_400_02_1113.pdf</a>	SMF (500M)
<a href="#">chen_400_01_1113.pdf</a>	SMF (advanced modulation)
<a href="#">cole_400_01a_1113.pdf</a>	SMF (duplex architectures)
<a href="#">CFI_01_0313.pdf</a>	Slides 25-38
<a href="#">gustlin_hse_01_0912.pdf</a>	PCS feasibility
<a href="#">cui_hse_01a_0912.pdf</a>	Impracticality of 1Tb/s (why 400Gb/s)
<a href="#">anslow_400_02_1113.pdf</a>	BER
<a href="#">trowbridge_400_01_0713.pdf</a>	OTN Support
<a href="#">dambrosia_400_01_0913.pdf</a>	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 equipment that supports IEEE 802.3 networks operating at different Ethernet rates has been amply demonstrated by a broad set of product offerings.
  - 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 Gb/s 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 Gb/s 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.