



25Gb/s Ethernet Study Group “Strong Consensus” Objectives

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Background on areas of strong consensus

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

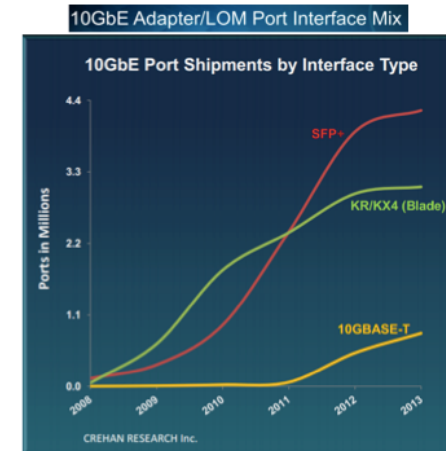
Strong consensus at CFI around backplane and twin-ax applications building on known 10G adoption.

Single Lane interfaces in 10GbE Server

- 10GbE volume ramp in servers coincided with the availability of single-lane interfaces
- Early adopters (2004-2008) used
 - XAUI-based optics
 - 10GBASE-CX4
 - 10GBASE-KX4
- Single-lane backplane and twinax solutions eclipsed the early-adopter volume starting in 2009

Chart notes

- "Other" category, not shown, went from ~12% in 2008 to <1% in 2013
- SFP+ majority use is twinax, then SR; accurate share data unavailable
- Blade server is mostly KR based upon system configuration. KX4 vs. KR split data unavailable.



Data source: Crehan Research, Inc., Q1'2014

IEEE 802.3 Call For Interest – 25Gb/s Ethernet over a single lane for server interconnect – July 2014 San Diego

http://www.ieee802.org/3/cfi/0714_1/CFI_01_0714.pdf
IEEE 802.3

Proposed Backplane Objectives

Interest in backplane for 25G

- Leverage the IEEE Std 802.3bj work for backplane
- Enable a single lane 25G version based on available technology

Therefore a proposed objective of:

- 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

Proposed Copper Twin-Ax Cable Objective

Primary Interest in twin-ax cables for 25G:

- Leverage the IEEE Std 802.3bj work
- Enable a single lane 25G version based on available technology
- Strong desire to maintain consistency with existing transmitter and receiver characteristics and overall channel loss budget

During ad hoc meetings, opportunities have been raised to potential application optimizations within these above constraints

- Excellent Task Force topics for discussion
- No effect on Technical Feasibility
- Key goal is developing an objective language to enable TF to do this work

Summary of application scenarios

25G CR copper cables summary

- Three potential cable applications
 - (1) Long cables
 - could use all electrical specifications for 100GBASE-CR4, could use 25G RS-FEC.
 - optimized for cable lengths up to 5m.
 - (2) Short cables application #1
 - reduced cable loss, optimized for cable lengths up to 3m.
 - without FEC to reduce latency
 - (3) Short cables application #2
 - reduced cable loss, optimized for cable lengths up to 3m.
 - with FEC, higher loss allocation for host boards
- RS-FEC could be optional for copper cables (avoids latency of 250ns).
- RS-FEC selection could be done by Auto Neg protocol.
- Could use RS, PCS, and FEC specifications per common architecture slides.
- Could specify EEE per adapted specifications.

based on http://www.ieee802.org/3/25GSG/public/adhoc/architecture/salunke_082814_25GE_adhoc.pdf and http://www.ieee802.org/3/25GSG/public/adhoc/architecture/mellitz_01_081914a_25GE_adhoc.pdf

Potential options for objectives

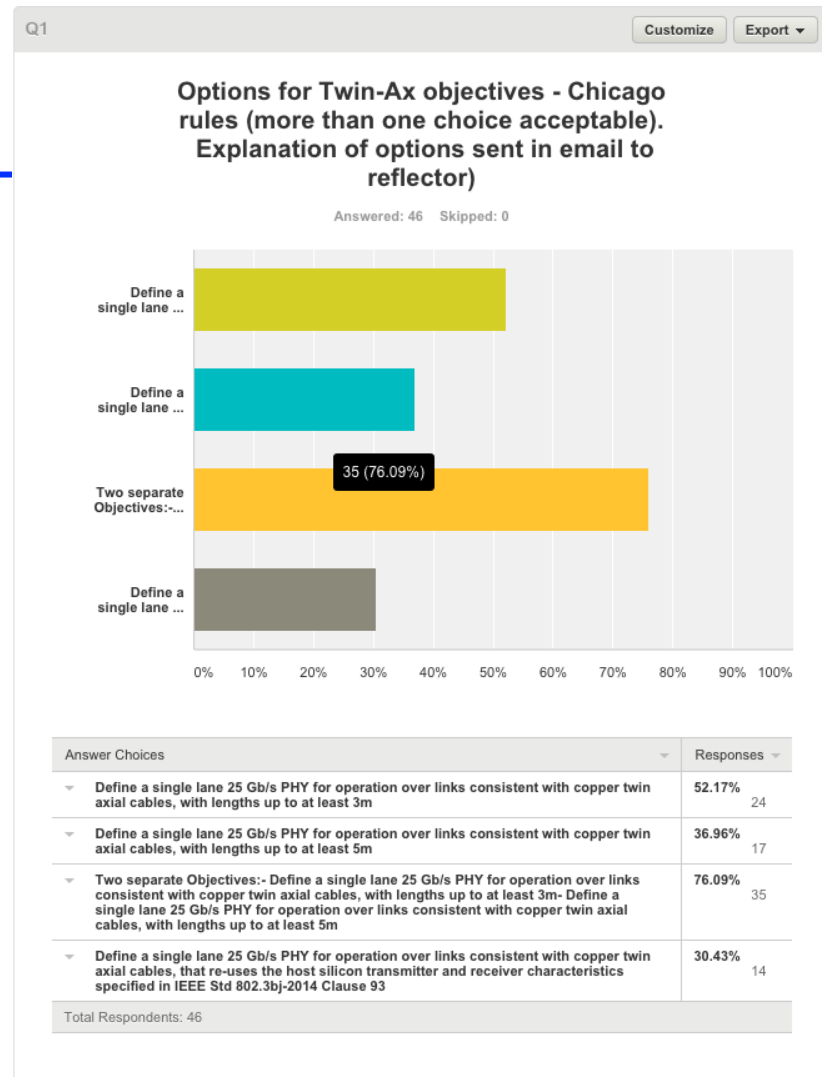
Based on ad-hoc discussions and straw polls, options were proposed and test. A final straw poll on options for Twin-ax options was run:

- A. 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
- B. 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
- C. Two Objectives:
 - 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
 - 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
- D. Define a single lane 25 Gb/s PHY for operation over links consistent with copper twin axial cables, that re-uses the host silicon transmitter and receiver characteristics specified in IEEE Std 802.3bj-2014 Clause 93

2nd Survey Monkey Straw Poll initiated

- Chicago rules of options
- Pick one
- Chicago rules on what you would oppose

2nd Straw poll results – Chicago Rules

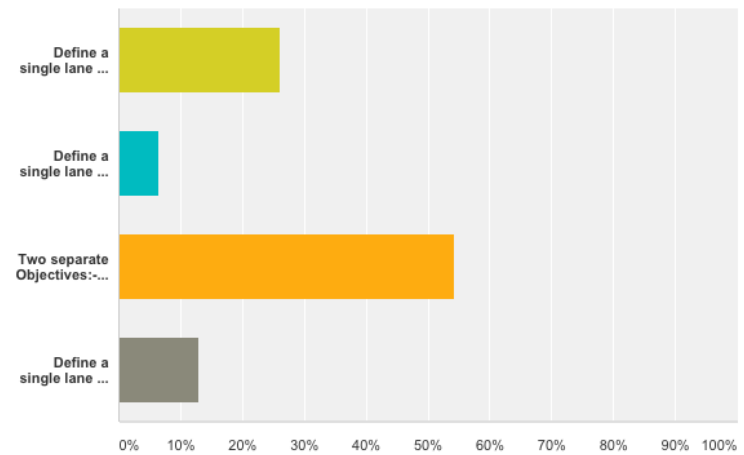


2nd Straw poll results – pick one

Q2 Customize Export

Options for Twin-Ax objectives - Pick One. Explanation of options sent in email to reflector

Answered: 46 Skipped: 0



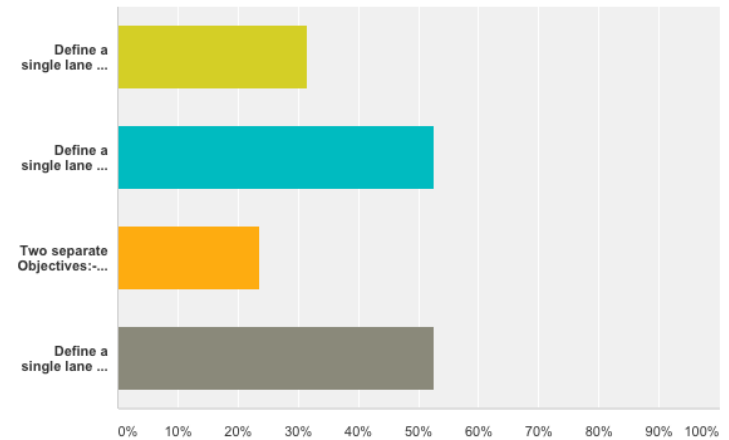
Answer Choices	Responses
Define a single lane 25 Gb/s PHY for operation over links consistent with copper twin axial cables, with lengths up to at least 3m	26.09% 12
Define a single lane 25 Gb/s PHY for operation over links consistent with copper twin axial cables, with lengths up to at least 5m	6.52% 3
Two separate Objectives:- 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- 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	54.35% 25
Define a single lane 25 Gb/s PHY for operation over links consistent with copper twin axial cables, that re-uses the host silicon transmitter and receiver characteristics specified in IEEE Std 802.3bj-2014 Clause 93	13.04% 6
Total	46

2nd Straw poll results – Chicago Rules negative variant

Q3 Customize Export

I would oppose these options for Twin-Ax objectives - Chicago Rules - pick all you would actually oppose by voting "No" against this option in a motion.

Answered: 38 Skipped: 8



Answer Choices	Responses
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	31.58% 12
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	52.63% 20
Two separate Objectives:- 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- 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	23.68% 9
Define a single lane 25 Gb/s PHY for operation over links consistent with copper twin axial cables, that re-uses the host silicon transmitter and receiver characteristics specified in IEEE Std 802.3bj-2014 Clause 93	52.63% 20
Total Respondents: 38	

Proposed Twin-Ax Objective language option A

Two Objectives:

- 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
- 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

Proposed Twin-Ax Objective language option B

Two Objectives:

- Define a single lane 25 Gb/s PHY including FEC, for operation over links consistent with copper twin axial cables, that re-uses the transmitter and receiver characteristics specified in IEEE Std 802.3bj-2014 Clause 93*
- Define a mechanism to disable the generation and decoding of FEC**

*This would support a total channel insertion loss of ≤ 35 dB at 12.9 GHz, and a nominal cable reach of 5 m, or a nominal cable reach of 3 m with relaxed host loss requirements.

**This would support a total channel insertion loss of ≤ 30 dB at 12.9 GHz, and a nominal cable reach of 3 m