Path forward for 100G SMF objectives in 802.3cd

Gary Nicholl - Cisco
Matt Brown - APM
Chris Cole - Finisar
Dave Lewis - Lumentum
Hai-Feng Liu - Intel
Jeff Maki - Juniper
Peter Stassar - Huawei
Kohichi Tamura - Oclaro

IEEE 802.3cd Task Force, Fort Worth, Sept 14-16, 2016

Contributors

- John D’Ambrosia - Huawei

Supporters

- Yu (Helen) Xu - Huawei
- Matt Traverso, Cisco
- Marco Mazzini - Cisco
- Tom Issenhuth - Microsoft
- Brad Booth - Microsoft
- Tad Hofmeister - Google
- Justin Abbott, Lumentum
- Jeff Twombly - Credo
- Phil Sun - Credo
- David Ofelt - Juniper
- Brian Welch - Luxtera
- Bharat Tailor - Semtech
- Mark Kimber - Semtech
- Yasuo Hidaka - Fujitsu
- Jerry Pepper - Ixia
- Thananya Baldwin - Ixia
- Ali Ghiasi - Ghiasi Quantum LLC
- Karen Liu - Kaiam
- Francesco Caggioni - APM
- Ryan Yu - Oplink/Molex
- Rick Rabinovich - Ixia
- Kent Lusted - Intel
- Adee Ran - Intel
- David Malicoat – HPE
- Nathan Tracy - TE
- Scott Sommers - Molex
- Rob Stone - Broadcom
- Ryan Latchman - Macom
- Atul Gupta - Macom
- John Dillard - Microsemi
- Hanan Leizerovich - MultiPhy
- Winston Way - Neophotonics
- Sudeep Bhoja - Inphi
- Andre Szczepanek - Inphi
- Scott Schube - Intel
- Rich Mellitz - Samtec
- Tom Palkert - Molex
- Mark Gustlin - Xilinx

Background

- Achieving consensus on choosing a baseline for the 2km objective has been challenging
- A potential “Path Forward” was suggested by Mark Nowell during the 802.3cd ad-hoc conference call on August 31, 2016.
  - nowell_083116_3cd_adhoc
- This presentation proposes a path forward for the 100G SMF objectives in 802.3cd based on nowell_083116_3cd

Adopted PHY objectives in 802.3cd

50 Gb/s Ethernet PHYs

** added after TF began

- Define single-lane 50 Gb/s PHYs for operation over
  - copper twin-axial cables with lengths up to at least 3m.
  - printed circuit board backplane with a total channel insertion loss of <= 30dB at 13.28125 GHz.
  - MMF with lengths up to at least 100m
  - SMF with lengths up to at least 2km
  - SMF with lengths up to at least 10km

100 Gb/s Ethernet PHYs

- Define a two-lane 100 Gb/s PHY for operation over
  - copper twin-axial cables with lengths up to at least 3m.
  - printed circuit board backplane with a total channel insertion loss of <= 30dB at 13.28125 GHz.
  - MMF with lengths up to at least 100m
  - SMF with lengths up to at least 500m ** adopted by TF 5/16, approved by WG 7/16
- Define a 100 Gb/s PHY for operation over SMF with lengths up to at least 2 km ** adopted by TF 5/16

200 Gb/s Ethernet PHYs

- Define four-lane 200 Gb/s PHYs for operation over
  - copper twin-axial cables with lengths up to at least 3m.
  - printed circuit board backplane with a total channel insertion loss of <= 30dB at 13.28125 GHz.
- Define 200 Gb/s PHYs for operation over MMF with lengths up to at least 100m

Source: nowell_083116_3cd_adhoc

The situation so far… presentations towards the objectives

Objective: Define a two-lane 100 Gb/s PHY for operation over SMF with lengths up to at least 500m

- http://www.ieee802.org/3/cd/public/July16/welch_3cd_01a_0716.pdf

Objective: Define a 100 Gb/s PHY for operation over SMF with lengths up to at least 2 km

- http://www.ieee802.org/3/cd/public/July16/cole_3cd_01a_0716.pdf
- http://www.ieee802.org/3/cd/public/July16/stassar_3cd_01a_0716.pdf
- http://www.ieee802.org/3/cd/public/July16/palkert_3cd_01_0716.pdf
- http://www.ieee802.org/3/cd/public/July16/traverso_3cd_01a_0716.pdf
- http://www.ieee802.org/3/cd/public/July16/lewis_3cd_01a_0716.pdf
- http://www.ieee802.org/3/cd/public/July16/maki_3cd_01a_0716.pdf

Source: nowell_083116_3cd_adhoc

Straw Polls in San Diego

Objective: Define a two-lane 100 Gb/s PHY for operation over SMF with lengths up to at least 500m

Straw Poll #4: I would support adopting welch_3cd_01a_0716 as a baseline for the 100 Gb/s 500m two lane SMF objective

Yes/No/Abstain: 18 / 3 / 57

Objective: Define a 100 Gb/s PHY for operation over SMF with lengths up to at least 2 km

Straw Poll #1: For the 100 Gb/s 2km SMF baseline (pick one):

A. I support the 1x100G proposal per lewis_3cd_01a_0716.pdf

B. I support the 2x50G proposal per cole_3cd_01a_0716.pdf

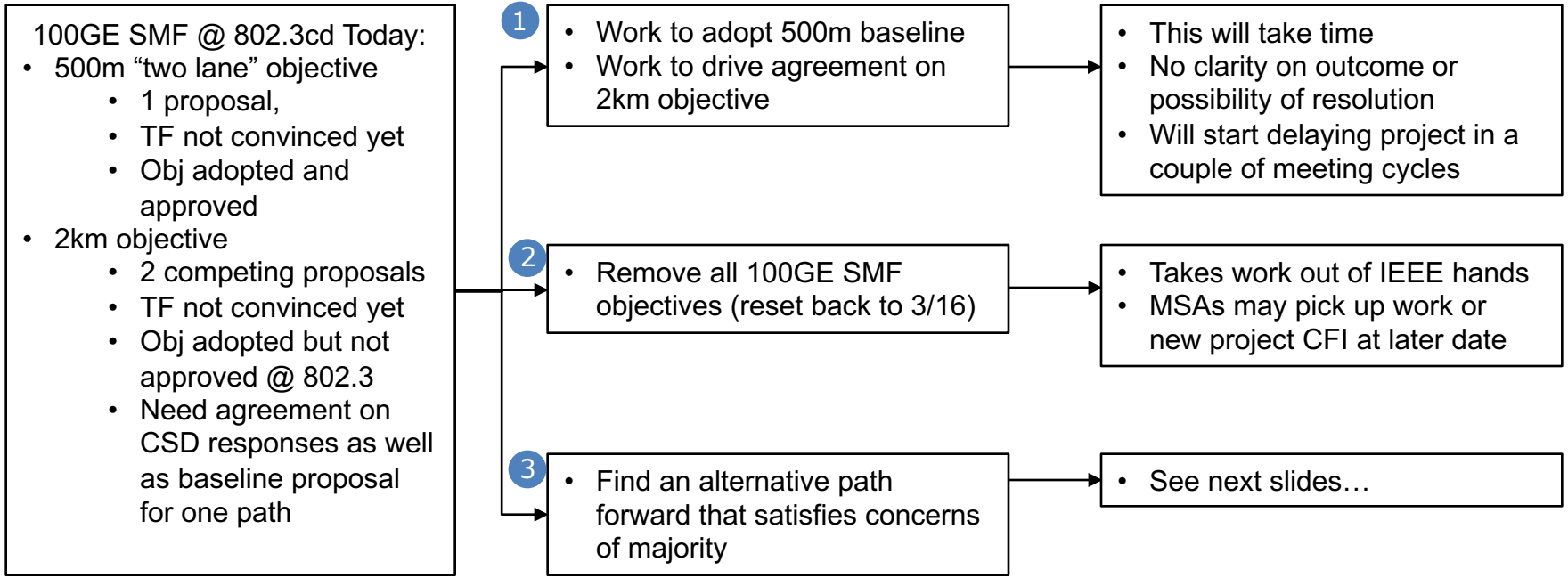
C. I want more information

- Results: A:34 B:25 C:36

Key takeaway: we have work ahead

Source: nowell_083116_3cd_adhoc

Possible paths forward



Source: nowell_083116_3cd_adhoc

Considerations for a path forward

- Technical concerns about 100G/λ achieving manufacturable 2km solution
  - 100G/λ for 500m (in 802.3bs) in process and being worked
- Two-lane 500m baseline seems to have multiple questions (per discussion in San Diego – see minutes)
- Original proposal to add new objectives (booth_3cd_01a_0516.pdf) requested 500m single lane to support breakout implementations for 400G-DR4
- Project documentation written when no 100GE SMF objectives were adopted in .3cd, and therefore CSD language currently references 50 Gb/s per lane technology leverage

Source: nowell_083116_3cd_adhoc

Proposed path forward

- Replace the current 100Gb/s PHY objectives with the following:
  - Define a two-lane 100 Gb/s PHY for operation over
    - Copper twin-axial cables with lengths up to at least 3m.
    - Printed circuit board backplane with a total channel insertion loss of <=30dB at 13.28125 GHz.
    - MMF with lengths up to at least 100m
  - Define a single lane 100 Gb/s PHY for operation over duplex SMF with lengths up to at least 500 m, consistent with IEEE P802.3bs Clause 124
- Update the CSD inline with the new objectives
  - See brown_3cd_02_0916

Conclusion

- The authors & supporters propose proceeding with the path forward captured in this presentation for the 100Gb/s PHY objectives
- Authors and supporters agree to support dropping 100G 2km SMF PHY objective within 802.3cd
- Authors and supporters agree to support adding a single lane 100G 500m SMF PHY objective within 802.3cd

Proposed Motion

Motion #

Move that the IEEE 802.3cd Task Force adopt the following objectives in replacement of existing 100 Gb/s Physical Layer objectives:

- Define a two-lane 100 Gb/s PHY for operation over
  - Copper twin-axial cables with lengths up to at least 3m.
  - Printed circuit board backplane with a total channel insertion loss of <=30dB at 13.28125 GHz.
  - MMF with lengths up to at least 100m
- Define a single lane 100 Gb/s PHY for operation over duplex SMF with lengths up to at least 500 m, consistent with IEEE P802.3bs Clause 124

M:
S:
Technical (>=75%)
Y: N: A: