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Consider SG Objective from IC Vendor Perspective

IEEE 802.3 100Gb/s Backplane and Copper Study Group
March Plenary Meeting, Singapore

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The Goal:

One major task for the Study Group:

- Development of clear objectives helps set up the goals for the task force.
  - Consider reach applications
  - To nail down objectives proposal
  - We need evidence to support what reaches are required.

- Not a goal – Choose a solution, but….
  - Do need to keep in mind technical feasibility & broad market potential
  - Pay attention to the need for new CMOS IP for chip I/O.
    - Avoid another 10GBASE-T like project.

40/100GbE PHY Types

Physical Layer Reach	1 m Backplane	7 m Copper Cable	100 m OM3, 125 m OM4 MMF	10 km SMF	40 km SMF
40 Gigabit Ethernet					
Name	40GBASE-KR4	40GBASE-CR4	40GBASE-SR4	40GBASE-LR4	
Signaling	4 x 10 Gb/s	4 x 10 Gb/s	4 x 10 Gb/s	4 x 10 Gb/s	
Media	Copper Backplane	Twinax Cable	MPO MMF	Duplex SMF	
Module/Connector		QSFP Module, CX4 Interface	QSFP Module, CFP Module	CFP Module	
100 Gigabit Ethernet					
Name		100GBASE-CR10	100GBASE-SR10	100GBASE-LR4	100GBASE-ER4
Signaling		10 x 10 Gb/s	10 x 10 Gb/s	4 x 25 Gb/s	4 x 25 Gb/s
Media		Twinax Cable	MPO MMF	Duplex SMF	Duplex SMF
Module/Connector		CXP Module	CXP Module, CFP Module	CFP Module	CFP Module

Source: IEEE P802.3ba

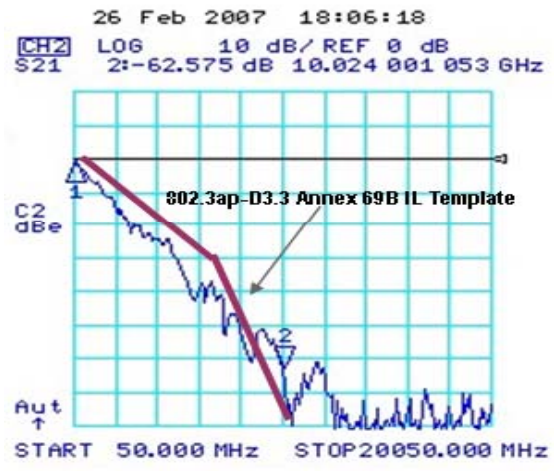
Backplane reach consideration

- Actual legacy channels can be pretty bad.
  - Seems straightforward to consider first step with 10x10G for 1m backplane??
- Early visibility into 25 Gb/s backplane channels reveals 2 categories:
  - Legacy 10 Gb/s designs
    - Long lengths (≈ 30")
    - 10G-generation trace material
    - 10G-genration connectors
  - New/Upgraded designs
    - Intermediate and short lengths (≈ 20" and 10")
    - Backwards compatible
    - 10G-generation trace material
    - Improved connectors

Example case study:

http://www.ieee802.org/3/100GCU/public/jan11/hatab_01_0111.pdf

Equalize this!!!



Can be pretty bad legacy channels (-60dB loss at 10G)

Cable reach consideration

Cable reach applications from 802.3ae and 802.3ba.

- <7-10m is very useful for interconnecting “adjacent” rack and shelves.
- <100m will generally serve within a datacenter.
- 220m (or 300m) serves from datacenter to remote closet which is only important for 10G to the desktop.
- • <2km will serve to carry aggregate capacities in super-datacenters or connections in a meta-datacenter, enterprise, carrier hotel, or campus.

Key take-aways

- The upper limit for backplane reach is debateable, PMA or Serdes vendors should have to step up to address NRZ vs. multi-level, and ensure that long reach beyond 30”(such as 1m) is possible and have to solve cross talk due to smaller SNR per level.
- Without significantly increasing the complex of PMA or Serdes, “better” or “improved” materials (PCB transmission line plus connectors), stronger FEC should be better allowed.
- With the assumption of NRZ, verify the feasibility of using 4x25G for 7-10m twinax cable.
- Support low BER of 10^{-15}, with a test requirement to verify at 10^{-12} (OIF CEI specs)

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Thank You!