100Gbs Electrical Signaling - Consensus on Scope

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IEEE 802.3 NEW ETHERNET APPLICATIONS AD HOC

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Agenda

General interest expressed in 100 Gb/s Electrical Signaling

Strong Interest in IEEE 802.3 NEA continue hearing presentations

See March 2017 straw polls

Planning for May meeting

Potential Topic Areas

- Impact of 100Gb/s electrical signaling on existing relevant PHYs for existing Ethernet data rates
- Potential of 100Gb/s electrical signaling for new relevant PHYs for existing Ethernet data rates
- Consider impact of 100Gb/s electrical signaling on new PHYs for new Ethernet rates

Strawpoll Summary (Preparations for May)

Strawpoll	Results
1. Is there interest in doing 800 Gigabit Ethernet at this time	Yes – 1 No – 15 Maybe – 20 – 25
2. Is there interest in developing AUI's based on 100 Gb/s electrical signaling per lane?	Yes – 43 No – 2 Maybe – 15
3. Is there interest in developing Backplane / Copper Cable PHYs based on 100 Gb/s electrical signaling per lane?	Yes – 18 No – 10 Maybe – 20
4. I would support: IEEE 802.3 NEA continue hearing presentations on a. 100 Gb/s based AUIs b. 100 Gb/s Copper PHYs c. 800 GbE d. 1.6 Terabit Ethernet e. 100 Gb/s per lane Optics	 a. 60 b. 33 c. 5 d. 6 e. 49

The Ethernet Family (100 Gb/s and Above)

	Signaling (Gb/s)	Electrical Interface	Backplane	Twin-ax	MMF	500m SMF	2km SMF	10km SMF	40km SMF
100GBASE-	10	CAUI-10		CR10	SR10		10X10		
	25	CAUI-4 / 100GAUI-4	KR4	CR4	SR4	PSM4	CWDM4 CLR4	LR4	ER4
	50	100GAUI-2	KR2	CR2	SR2		-		
	100	?	?	?	?	DR	?	?	?
200GBASE-	25	200GAUI-8							
	50	200GAUI-4	KR4	CR4	SR4	DR4	FR4	LR4	
	100	?	?	?	?	?	?	?	
400GBASE-	25	400GAUI-16			SR16				
	50	400GAUI-8					FR8	LR8	
	100	?	?	?	?	DR4	?	?	

Includes Ethernet standards in development

Underlined – indicates industry MSA or proprietary solutions

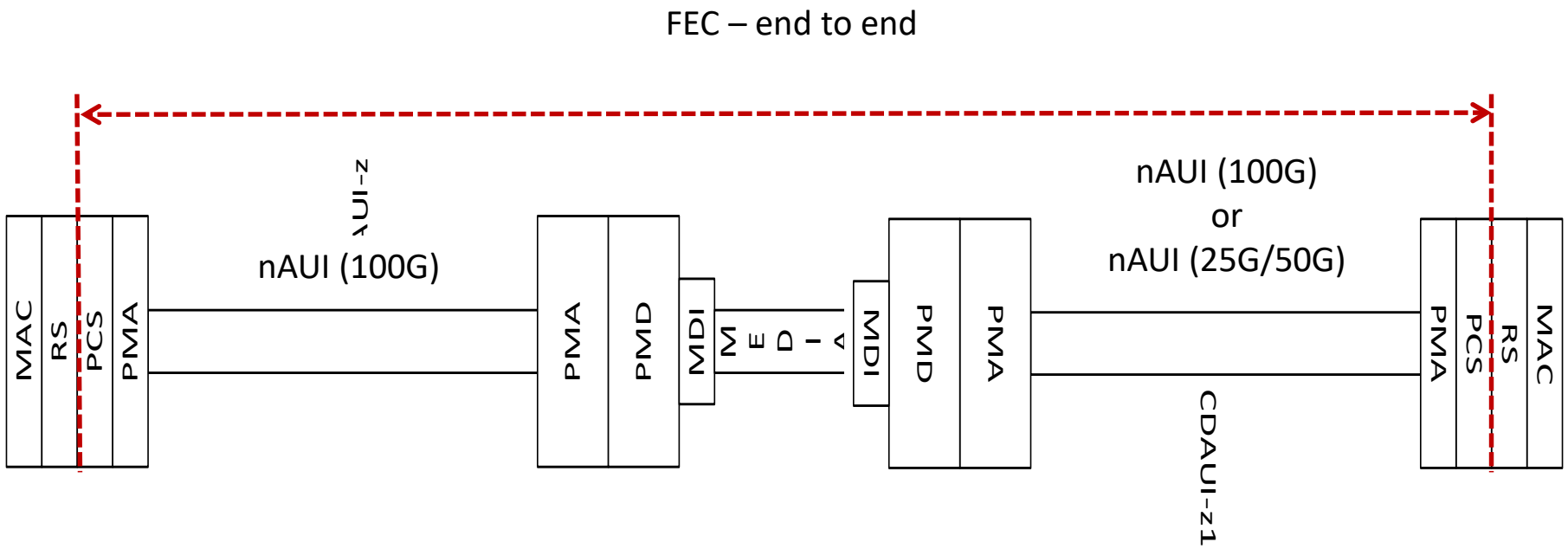
PHY Impacted by new AUI?

New PHY?

Observations

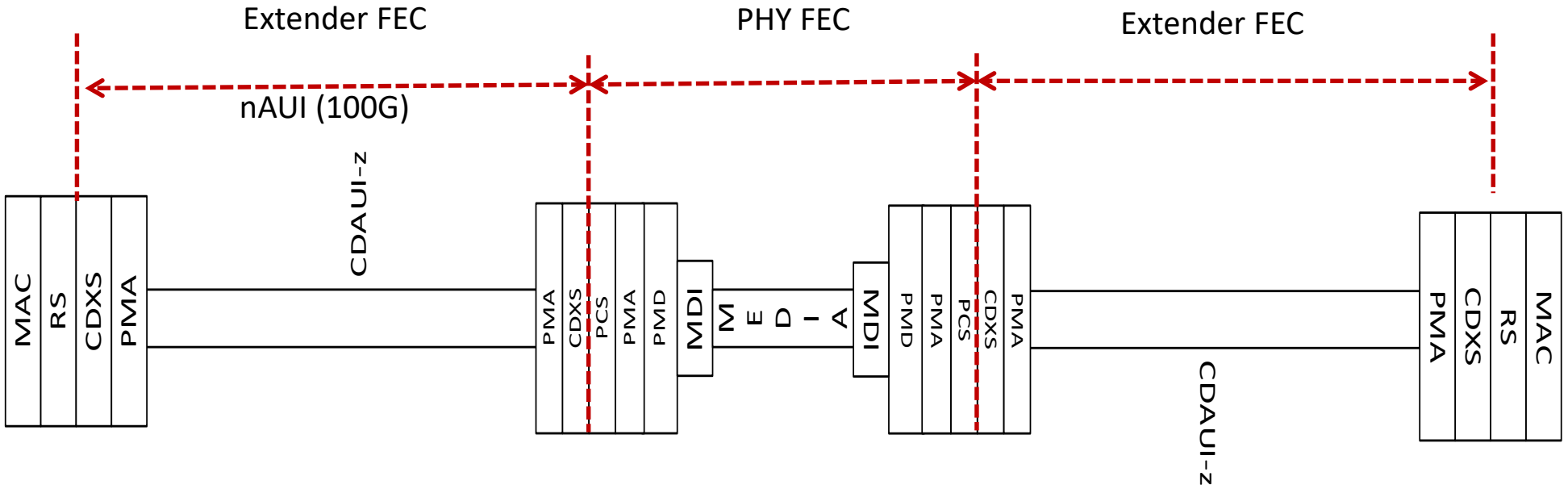
- Existing PHYs for existing rates
  - Only 100GBASE-DR and 400GBASE-DR4 PHYs based on 100Gb/s per lambda solutions
  - All other PHYs, for 100GbE, 200GbE, and 400GbE, based on 25Gb/s or 50 Gb/s solutions
  - Observation – using a 100G based AUI would require demux to support nearly all existing PHYs.
- New PHYs for existing rates
  - What are they?
    - 100GBASE-FR / 400GBASE-FR4?
    - 100 / 200 / 400 GBASE-KRn?
    - Others?
  - Error model of PMDs?
  - FEC Structure
- New PHYs for new rates
  - 800G or 1.6T debate
  - PMD?
    - Currently- only 100Gb/s based solutions for 500m under consideration in IEEE 802.3 projects

IEEE 802.3bs Architecture



- Will this approach
  - work with current KP FEC to support existing PHYs?
  - Interact with existing deployments of existing PHYs?
  - Work for new PHYs?
- Channel definition for C2C and C2M interfaces?

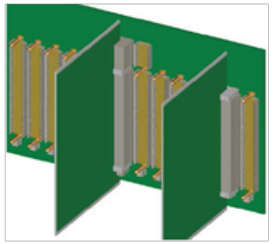
IEEE 802.3bs Extender Approach



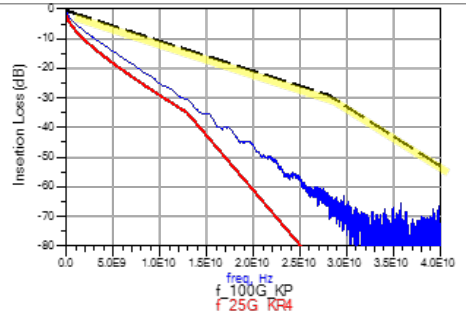
- Is this approach necessary?
- Can KP4 FEC enable a 100G based AUI?
  - What would the channel look like? Reduced reach?
- Is a new FEC required?
- Latency impact?

100G-based Backplane PHY

Traditional Backplane



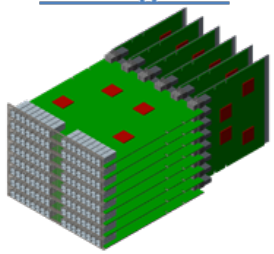
- 1.0m (40”) of Meg6
- 2 BP connectors
- 5.1mm (0.200”) thick BP
- 2.8mm (0.110”) thick DCs



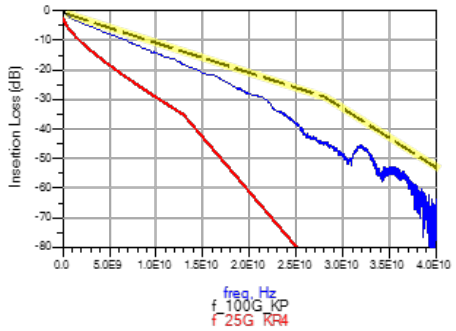
25G limit
100G limit
Existing channel

Epic Fail

Orthogonal



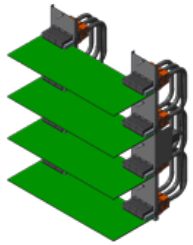
- 0.5m (20”) of Meg6
- 1 DPO connector
- 2.8mm (0.110”) thick DCs



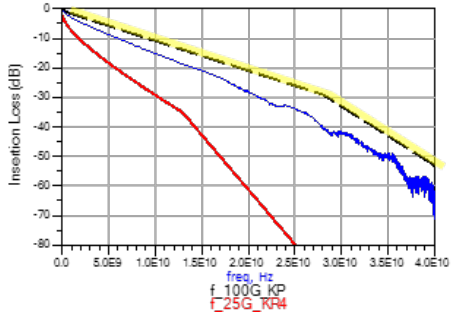
25G limit
100G limit
Existing channel

Fail

Cabled Backplane



- 0.3m (12”) of Meg6
- 1.0m of 30AWG HS cable
- 2 cable connectors
- 2.8mm (0.110”) thick DCs



25G limit
100G limit
Existing channel

Fail

What
Is a
“backplane”?

Channel
characteristics?

Source: Nathan Tracy, TE Connectivity, DesignCon 2017 - CEI-112G: Considering Electrical Channels.”

Scope of New Effort?

- Project could entail a few or multiple topics?
- Project definitions could be specific, but limiting
  - New AUI?
  - New PHY?
  - New PMD?
- Needs consensus building

Summary – Suggested Presentations for May

- AUI
  - Channel Definition
  - Error models
- PHY support
  - Existing
    - Need?
    - Demux requirement?
  - What new 100 Gb/s per lane PHYs?
    - Error models of new PMDs?
- FEC analysis - Existing KP4 versus new FEC?
  - End-to-end versus Segmented FEC (AUI + PMD)
  - AUI (Chip-to-chip / Chip-to-module)
  - PMD
- Backplane
  - What is backplane
  - Channel definitions
- Others?