

200G/lane AUI BER Targets inside Type 1 and Type 2 PHYs

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Introduction

- In May 2023, the 3dj Task Force adopted a DER_0 value of 2.67E-5 for the high-loss AUIs within a PHY
- The medium-loss AUI BER allocation was left unresolved. This presentation looks at the options
- AUIs are optional instantiations
- Note: “BER” is loosely used in this contribution to represent “random BER” and recognize there is much discussion on the topic

Motion #8

Move to:

- adopt a DER0 value of 2.67e-5 (equivalent to measured BER of 4e-5 with precoding ON) as the total allocation for higher-loss AUIs within a PHY (BER division between C2C and C2M as well as the measurement method to be determined later)

M: Adee Ran

S: Kishore Kota

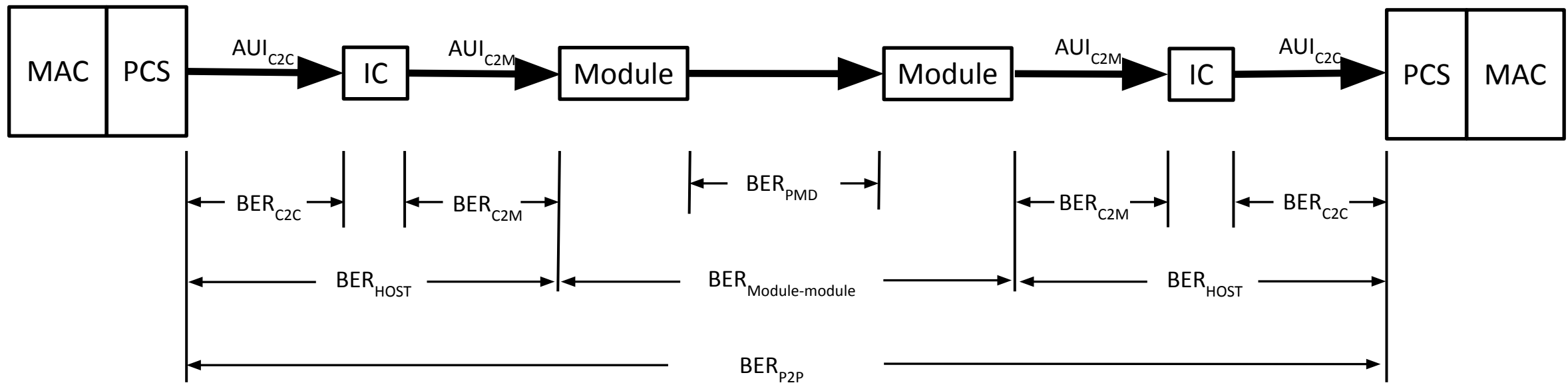
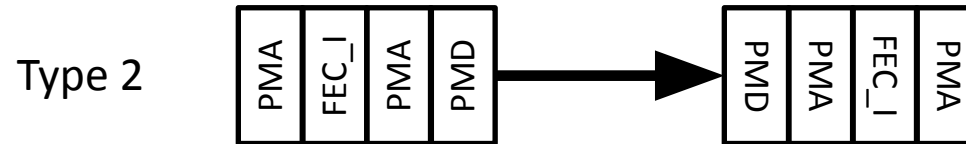
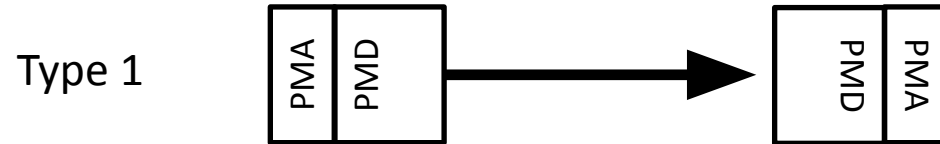
Technical ($\geq 75\%$) Procedural ($> 50\%$)

802.3 voters only

Results: Y: 75, N: 3, A: 20 passed 10:33 a.m.

https://www.ieee802.org/3/dj/public/23_05/motions_3cwdfdj_2305.pdf

Link Diagram Reference



The model above was provided for illustrative purposes to enable discussion. No formal budget has been adopted.

Interoperability Goals

To maximize broad market potential, we want to be able to mix and interoperate:

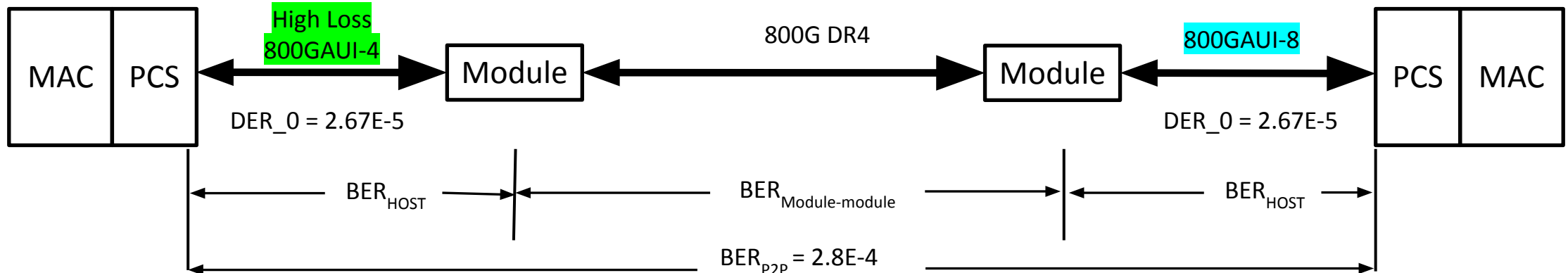
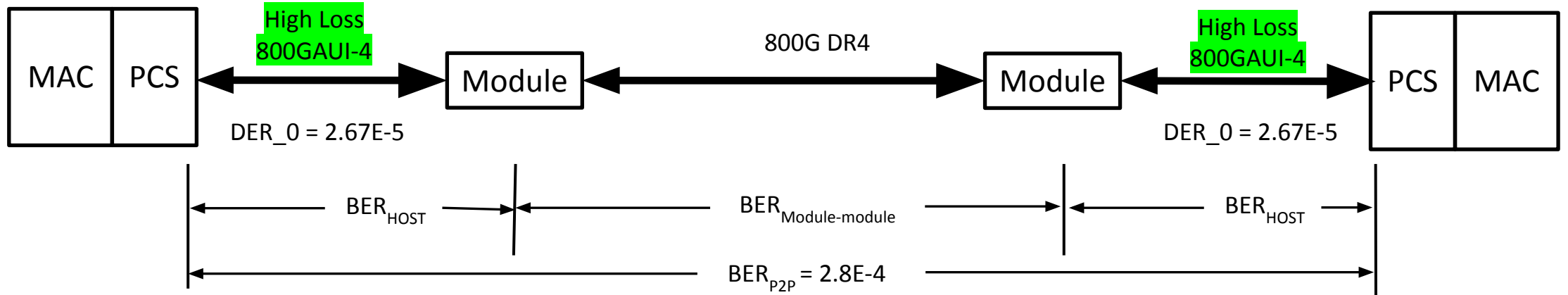
- 800 GbE hosts with 100G/lane-based AUIs to 800 GbE hosts with 200G/lane-based AUIs
 - and of course 100G/lane AUI to 100G/lane AUI or 200G/lane AUI to 200G/lane AUI
- Any 800 GbE host being able to support 200G/lane-based PMDs or 100G/lane-based PMDs

This was the case for 200 GbE and 400 GbE which has been implemented with hosts with 50G/lane-based AUIs or 100G/lane-based AUIs.

Current status

With the adoption of DER_0 value of $2.67\text{E-}5$ for the total allocation for higher-loss 200G/lane-based AUIs within a PHY, we have full interoperability with 100G/lane-based AUI hosts

Interoperability Examples - 800G-DR4



FEC Bypass

- Per the straw poll in May 2023, there is considerable interest in working towards a FEC bypass mode to support low-latency solutions
- Definition and specification of medium-loss AUIs also needs to consider this goal

Straw Poll #13

I am interested in working towards enabling an inner code FEC bypass approach for 200 G/lambda IMDD optics

- A. all single wavelength
- B. multi-wavelength 2km
- C. none
- D. NMI
- E. abstain

(chicago rules)

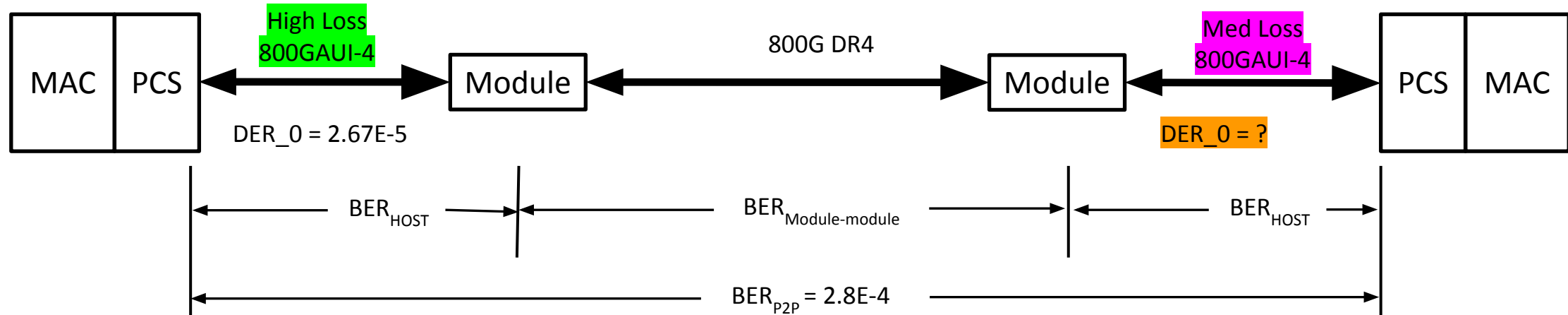
results: A: 76 , B: 61, C: 19, D: 22, E: 11

https://www.ieee802.org/3/dj/public/23_05/motions_3cwdfdj_2305.pdf

How about a Medium Loss 200G-based AUI?

- Potentially consistent with a co-packaged (CPO) or near-packaged optics (NPO) implementation
 - Potential for reduced power host serdes
 - Potential for reduced power module DSP (relaxed equalization)
- Definition of a medium loss 200G-based AUI, however, can not change the target DER₀ without creating a matrix of interoperability issues that would have to be worked through in detail

Medium Loss AUI Considerations



- Ensure interoperability with hosts implemented with 200G/lane high loss AUI
- Ensure interoperability with hosts implemented with 100G/lane AUIs (e.g. 800G-AUI8)
- Impact to module/DSP design targets - one spec/solution independent of AUI
- FEC bypass mode

Keep it simple

As shown in nicholl_3dj_01_2307, maintaining a consistent AUI BER target across 100G/lane and 200G/lane generations greatly simplifies the goals of interoperability and reduces product implementation variants and maximizes broad market potential

Summary

Spanning generations of electrical interfaces and PMDs is important for:

- Maximizing broad market potential
- Simplifying interoperability
- Reducing product implementation variants

A different AUI BER target for med-loss 200G/lane AUIs has a lot of disadvantages and complications. Is it worth it?

Furthermore, it is unclear of the value in defining a medium-loss AUI?

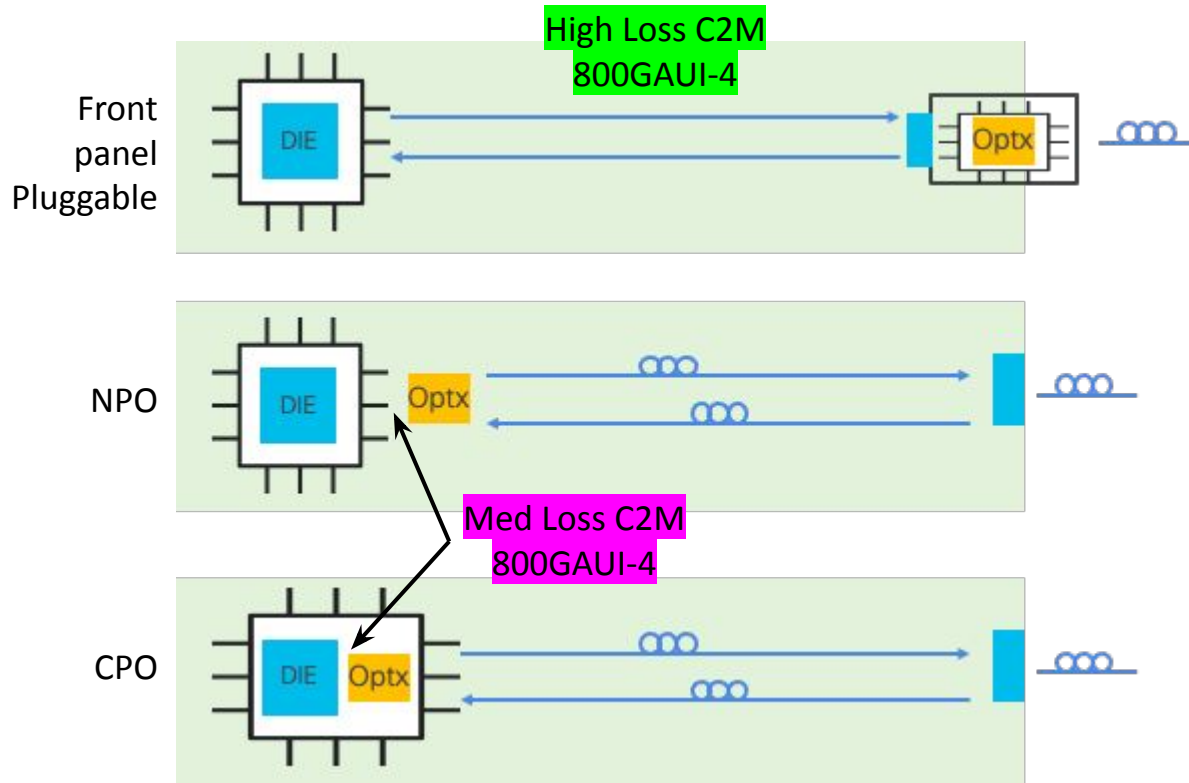
- If we do, we should align medium-loss 200G/lane AUI BER target to the established high-loss 200G/lane AUI BER target

Straw polls on these topics are planned

We must determine the BER_{HOST} and BER_{MODULE} now so both optics and electrical move forward!

Thanks!

CPO/NPO & Medium Loss AUI



Host ASIC: MAC, PCS, RS(544,514) FEC
 AUI: 106.25 Gb/s
 Module: CDR, Inner code BCH FEC, extender (optional)

Option 1: BCH in Optics

Host ASIC: MAC, PCS, RS(544,514) FEC
 AUI: 106.25 Gb/s
 Module: CDR, Inner code BCH FEC, extender (optional)

Option 2: BCH in ASIC

Host ASIC: MAC, PCS, RS(544,514) FEC, Inner code BCH FEC
 AUI: ~113 Gb/s
 Module: CDR

Host ASIC: MAC, PCS, RS(544,514) FEC, Inner code BCH FEC
 AUI: ~113 Gb/s
 Module: CDR

- Interop required between all implementations
- Does Medium Loss AUI need to be defined at two data rates?