200G/lane AUI BER Allocation for Type 1 and Type 2 PHYs

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v1p0

Supporters and Contributors

Supporters:

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Contributors:

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Introduction

- In July 2023, the 3dj Task Force adopted a DER_0 value of 2.67E-5 for the AUIs within a PHY
- This contribution will focus on the allocation of BER for AUIs inside a Type 1 or Type 2 PHY (not part of an extender sublayer)
  - 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 #6

Move to adopt one DER0 value of 2.67e-5 (equivalent to measured BER of 4e-5 with precoding ON) as the total allocation for 200Gbps/lane AUIs within a PHY (BER division between C2C and C2M as well as the measurement method to be determined later)

M: Adee Ran

S: Tobey P.-R. Li

Technical (>=75%)

802.3 voters only

Result: passed by unanimous consent. 9:19 a.m.

https://www.ieee802.org/3/dj/public/23_07/motions_3cwdfdj_2307.pdf

PHY/FEC types defined in https://www.ieee802.org/3/dj/public/23_03/brown_3dj_01a_2303.pdf

Current status

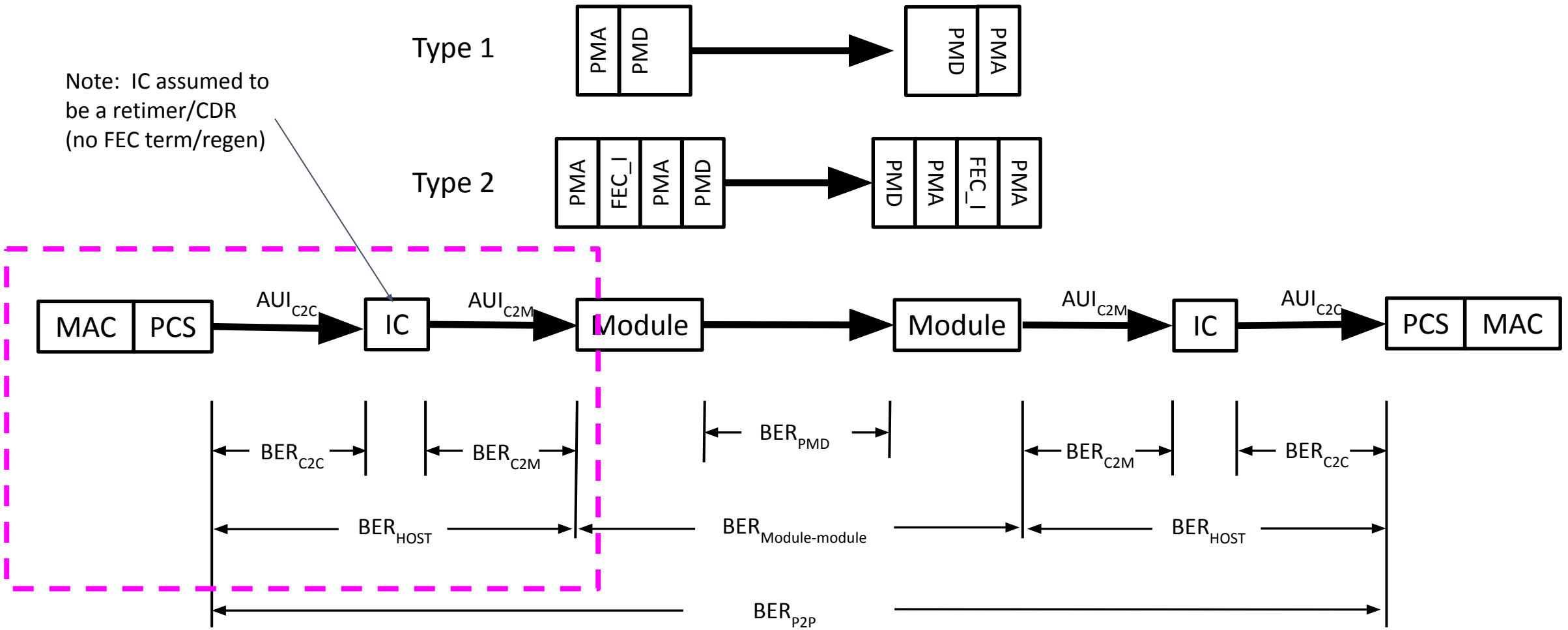
The allocation of the DER_0 between the AUI C2M vs. AUI C2C is currently not adopted

Presentations on the topic include:

- https://www.ieee802.org/3/dj/public/23_07/ran_3dj_01a_2307.pdf
- https://www.ieee802.org/3/dj/public/23_07/ghiasi_3dj_02a_2307.pdf
- https://www.ieee802.org/3/dj/public/adhoc/electrical/23_0817/ran_3dj_01_230817.pdf
- https://www.ieee802.org/3/dj/public/adhoc/electrical/23_0622/lit_3dj_elec_01_230622.pdf
- https://www.ieee802.org/3/dj/public/adhoc/electrical/23_0622/ghiasi_3dj_02_2309.pdf
- https://www.ieee802.org/3/dj/public/adhoc/electrical/23_0622/lusted_3dj_02_2309.pdf

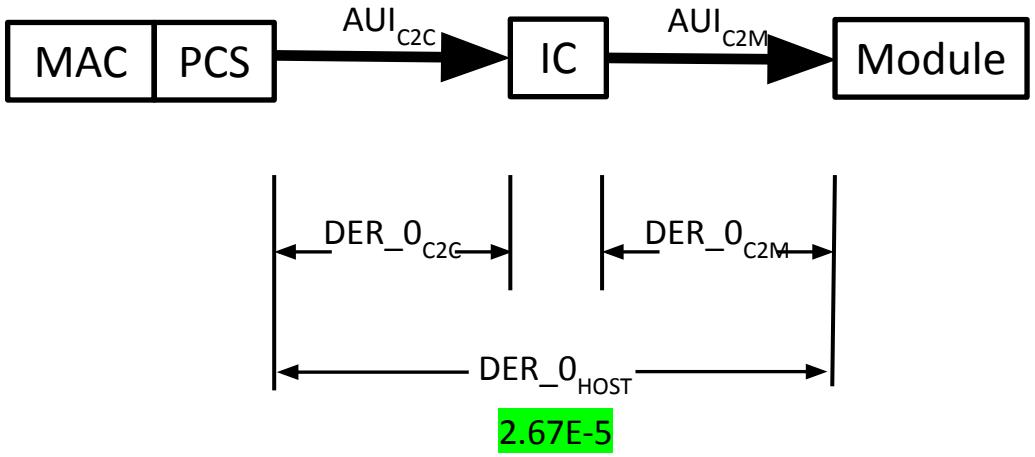
Explicit allocation of DER_0 is needed to progress towards AUI C2M and AUI C2C baseline proposals

Link Diagram Reference - BER



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

Link Diagram Reference Using DER_0



Will use DER_0 to avoid “BER” term conundrum

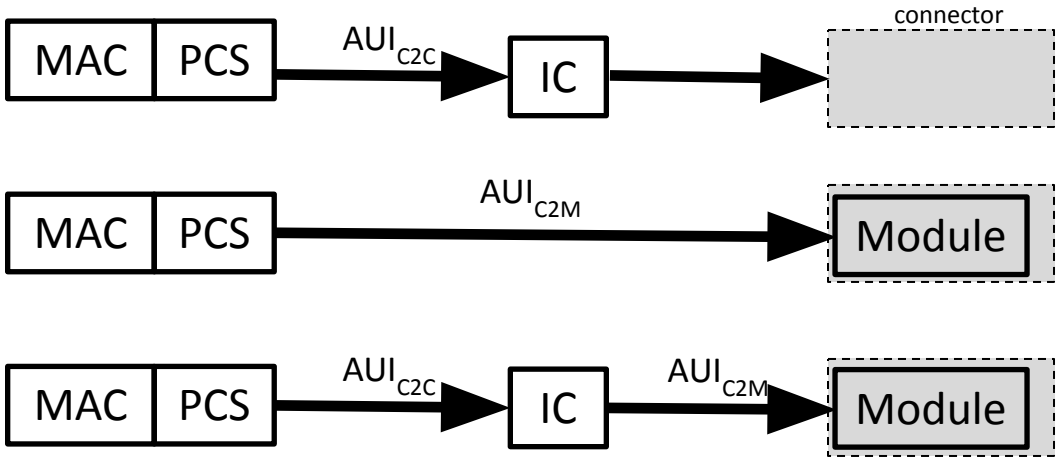
DER_0 total was set by a motion

DER_0 needed for COM analysis

Note: AUIs inside Type 1 and Type 2 PHYs

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

Common AUI Use Case Examples - FPP



Host IC “Retimer” to passive copper cable

No IC “Retimer” to Module

Host IC “Retimer” to Module

Note: AUIs inside Type 1 and Type 2 PHYs

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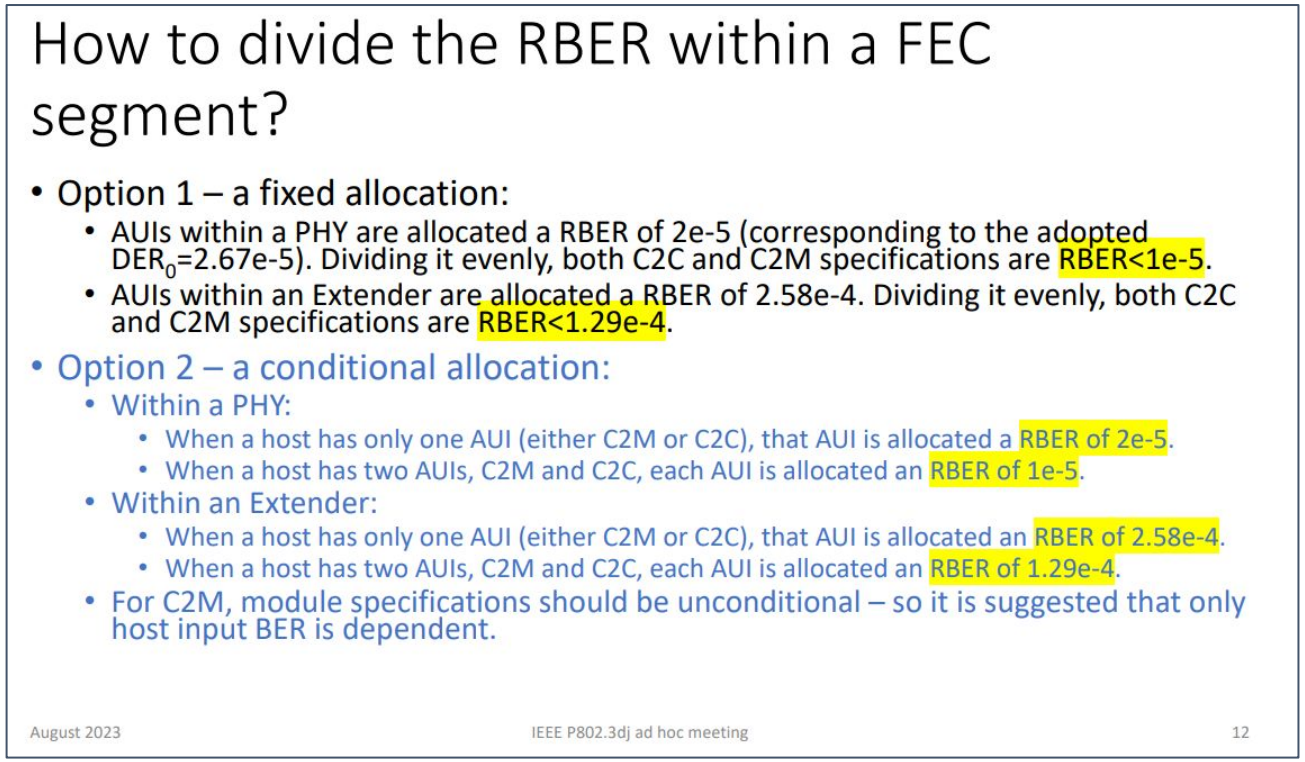
Two Choices for DER_0 Allocation of C2M

Choice A: “always a single value”

Choice B: “one of two values”



How to divide the RBER within a FEC segment?

- Option 1 – a fixed allocation:
  - AUIs within a PHY are allocated a RBER of 2e-5 (corresponding to the adopted DER_0=2.67e-5). Dividing it evenly, both C2C and C2M specifications are RBER<1e-5.
  - AUIs within an Extender are allocated a RBER of 2.58e-4. Dividing it evenly, both C2C and C2M specifications are RBER<1.29e-4.
- Option 2 – a conditional allocation:
  - Within a PHY:
    - When a host has only one AUI (either C2M or C2C), that AUI is allocated a RBER of 2e-5.
    - When a host has two AUIs, C2M and C2C, each AUI is allocated an RBER of 1e-5.
  - Within an Extender:
    - When a host has only one AUI (either C2M or C2C), that AUI is allocated an RBER of 2.58e-4.
    - When a host has two AUIs, C2M and C2C, each AUI is allocated an RBER of 1.29e-4.
  - For C2M, module specifications should be unconditional – so it is suggested that only host input BER is dependent.

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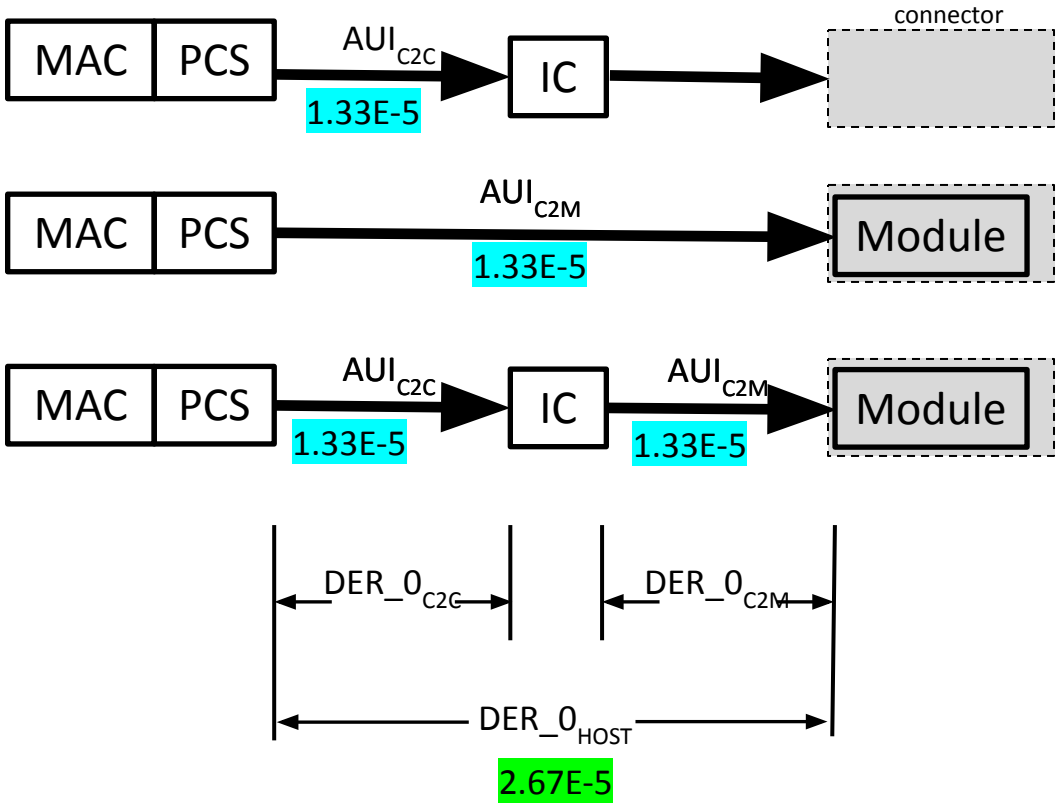
https://www.ieee802.org/3/dj/public/adhoc/electrical/23_0817/ran_3dj_01_230817.pdf

A1: “always a single value” - 50/50



Divide the allocation equally between C2M and C2C (50%/50%)

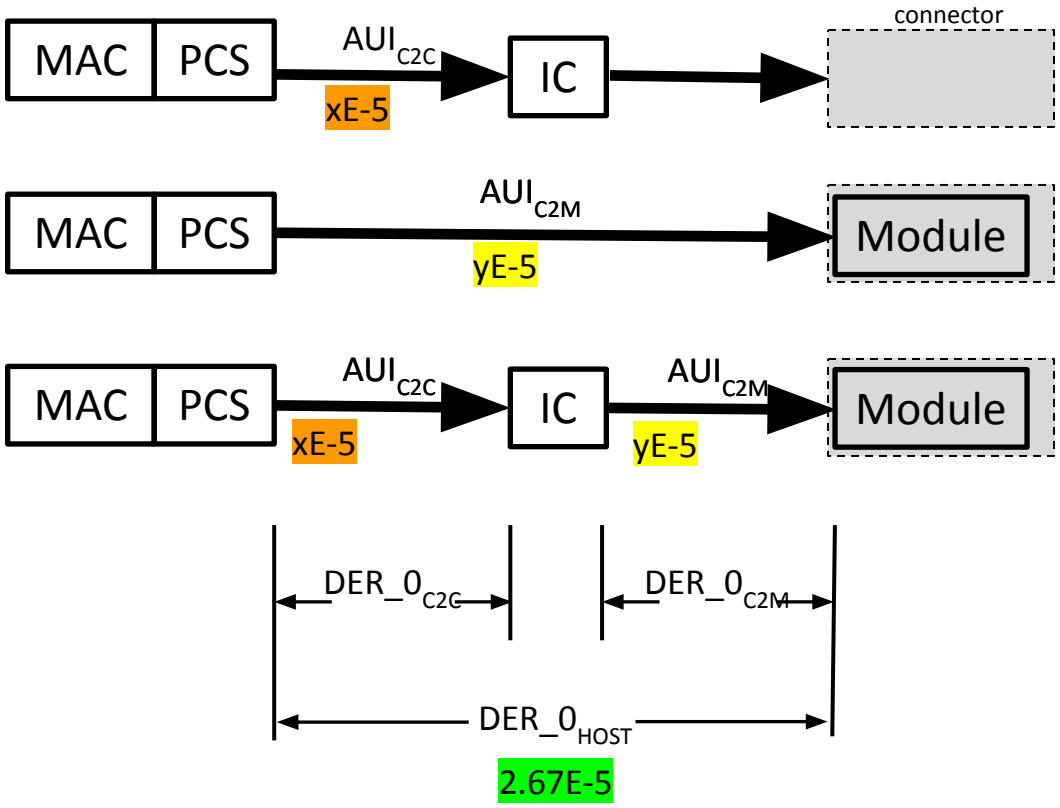
Allocation never changes

Favors simplicity over DER_0 budget

Note: AUIs inside Type 1 and Type 2 PHYs

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

A2: “always a single value” - X/Y



Divide the allocation with ratio TBD between C2M (Y) and C2C (x)

x+y = 2.67 and x != y and x < y

Allocation never changes

Favors simplicity over DER_0 budget

Note: AUIs inside Type 1 and Type 2 PHYs

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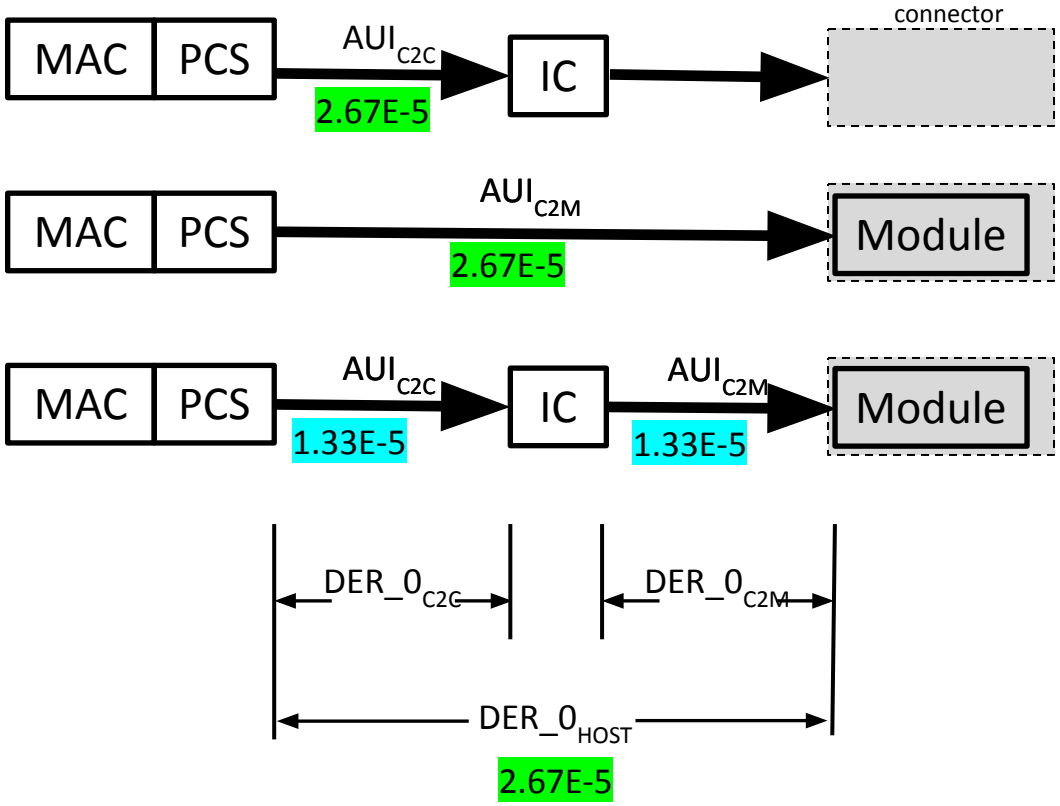
B1: “one of two values” - 50/50



Divide the allocation between C2M and C2C:

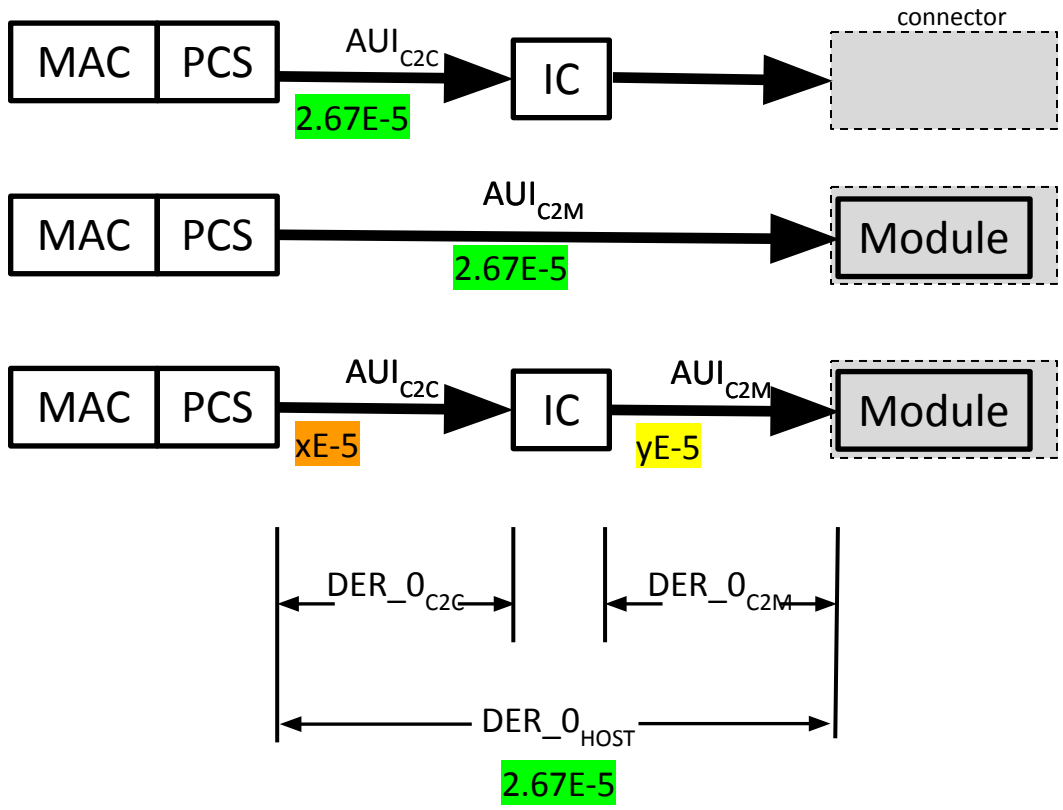
- If host has only one AUI , DER_0 = 2.67E-5
- If two has two AUIs (e.g. C2M and C2C), each AUI is allocated a DER_0 = 1.33E-5

Favors DER_0 budget over simplicity

Note: AUIs inside Type 1 and Type 2 PHYs

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

B2: “one of two values” - X/Y



Divide the allocation between C2M and C2C:

- If host has only one AUI , DER_0 = 2.67E-5
- If two has two AUIs (e.g. C2M and C2C) with ratio TBD between C2M (Y) and C2C (x)
- x+y = 2.67 and x != y and x < y

Favors DER_0 budget over simplicity

Note: AUIs inside Type 1 and Type 2 PHYs

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

AUI DER_0 Allocation Choices

	DER_0 allocation		
	AUI C2C and AUI C2M	**AUI C2C only**	**AUI C2M only**
Choice A1	1.33E-5 and 1.33E-5	1.33E-5	1.33E-5
Choice A2	xE-5 and yE-5 (x+y = 2.67 and x != y and x < y)	xE-5	yE-5
Choice B1	1.33E-5 and 1.33E-5	2.67E-5	2.67E-5
Choice B2	xE-5 and yE-5 (x+y = 2.67 and x != y and x < y)	2.67E-5	2.67E-5

Summary

- The allocation of the DER_0 between the AUI C2M vs. AUI C2C is currently not adopted
- Two high-level choices for DER_0 allocation for C2M:
  - Choice A: “always a single value”
  - Choice B: “one of two values”
- Each choice has a second level decision of 50/50 or x/y ratios

Straw polls and possible motions on these topics were requested

We must determine the AUI DER_0 allocation (C2M vs. C2C) now to progress towards baselines!

Thanks!