# The State of Link Budgeting

**IEEE 802.3dj Task Force**
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# My Role as Chair

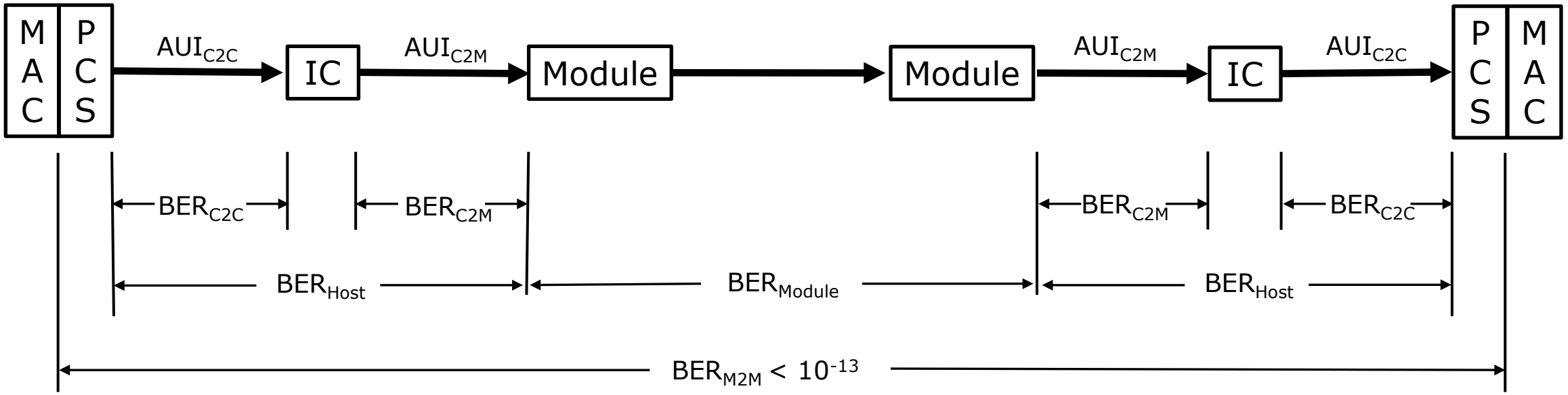
Per the IEEE 802.3 Ethernet WG Operations Manual (http://www.ieee802.org/3/rules/P802_3_rules.pdf)

- The operation of the TF has to be balanced between democratic procedures that reflect the desires of the TF members and the TF Chair's responsibility to produce a draft standard, recommended practice, or guideline in a reasonable amount of time for review and approval by the WG. Robert's Rules of Order shall be used in combination with these operating rules to achieve this balance.
- The full responsibilities of the chair are specified in 3.4.3 Task Force Chair’s Responsibilities.

# Introduction

- Work is underway within the Electrical Track to determine BER budgeting
  - Potential AUI implementations
    - Within PHY – C2M
    - Within PHY – C2C
    - Within xMII Extender
  - General discussion has focused on 200Gb/s / lane
  - 100 Gb/s/lane budgeting set by 802.3ck and leveraged by 802.3df
- Participants within the Optical Track need a target PMD number for baseline development and evaluation

# Simple Budget Overview Review




- The model above was provided for illustrative purposes to enable discussion
  - "BER" is loosely used to represent "random BER" and recognize there is much discussion on that topic
  - Refinement probably necessary
- No formal budget model / approach has been adopted

# Status

- AUI channel measurements / reporting have been provided on application basis –
  - C2C (Medium Loss / High Loss)
  - C2M (Medium Loss / High Loss)
  - NPO (type of C2M)
  - OBO (type of C2M)
- No decision or straw poll has been made regarding the types of AUIs
  - By Loss?
  - By BER?
  - Just one type of C2C AUI and one type of C2M AUI?
- Relevant decisions to date
  - 100G based AUIs BER budget determined by 802.3ck and leveraged by 802.3df
  - Motion #8 May 2023 Interim
    - 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)

# Development of AUIs for IEEE P802.3dj

| Interface | Options |
|---|---|
| AUI C2C | • None<br>• C2C – 100G per lane<br>• C2C – 200 G per lane / med loss<br>• C2C – 200 G per lane / high loss |
| AUI C2M | • None<br>• C2M – 100G per lane<br>• C2M – 200 G per lane / med loss<br>• C2M – 200 G per lane / high loss |

- Any combination of these two types of AUIs is currently permissible within a BASE-R PHY
- All combinations will need to be analyzed to determine worse cast BER MODULE
- AUIs are optional, therefore a $BER_{AUI}$ for when no AUIs are present must be identified

# Potential Scenarios for 802.3dj to Support

| Config | C2C | C2M | 100G / Lane PMDs | 200G / Lane PMDs | 800G / lane PMDs |
|---|---|---|---|---|---|
| 1 | None | None | | | |
| 2 | | 100G per lane | | | |
| 3 | | 200 G per lane / med loss | | | |
| 4 | | 200 G per lane / high loss | | | |
| 5 | 100G per lane | None | | | |
| 6 | | 100G per lane | | | |
| 7 | | 200 G per lane / med loss | | | |
| 8 | | 200 G per lane / high loss | | | |
| 9 | 200 G per lane / med loss | None | | | |
| 10 | | 100G per lane | | | |
| 11 | | 200 G per lane / med loss | | | |
| 12 | | 200 G per lane / high loss | | | |
| 13 | 200 G per lane / high loss | None | | | |
| 14 | | 100G per lane | | | |
| 15 | | 200 G per lane / med loss | | | |
| 16 | | 200 G per lane / high loss | | | |

Effects of “FEC bypass” need to be considered if adopted

# Summary of the Current State

- AUI development needs to consider various configurations of
  - Optional 100Gb/s-based and or 200 Gb/s based AUIs
  - 100 Gb/s, 200 Gb/s, and 800 Gb/s per lane based optical PHYs
- Decisions may impact
  - Backwards compatibility support
  - Interoperability
  - Broad Market Potential
- There are potentially 256 [16 x 16] different configurations that could require analysis
  - The final number to be analyzed will be determined by decisions yet to be made
- The target BER that optical PMDs must support needs to be identified to enable optical baseline development & evaluation
- Remember project timeline!