CDAUI: Objective Proposal

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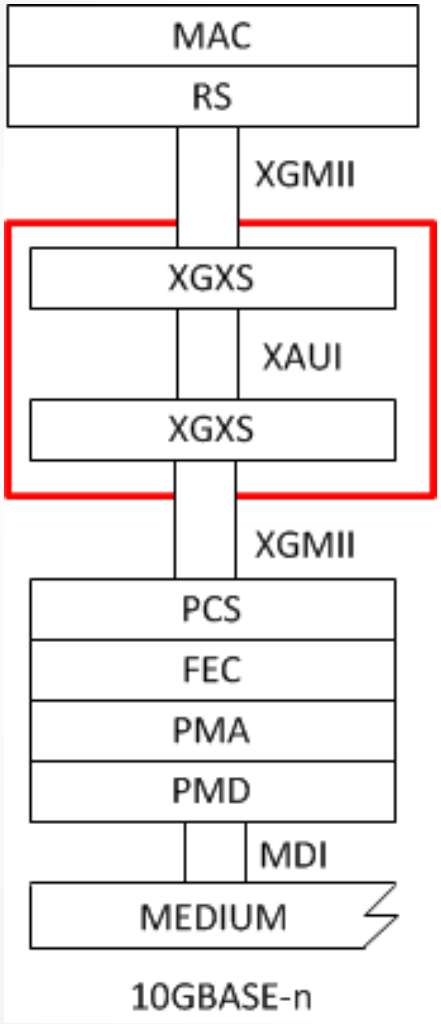
Introduction

- Initial discussions regarding FEC for PMDs has raised a number of other discussions
  - CDAUI:
    - Will FEC be needed for CDAUI?
    - Will FEC be same for different generations of CDAUI, i.e 16x25, 8x50, 4x100?
    - Will FEC for CDAUI be same as PMDs?
  - Interoperability between different generations of CDAUI / FEC / PMDs?
  - Possibility of a 100G Extender Sublayer (CDGXS)?

Historical Perspectives 802.3ae and 802.3ba

10 GbE Architecture



XGXS Sub-layer

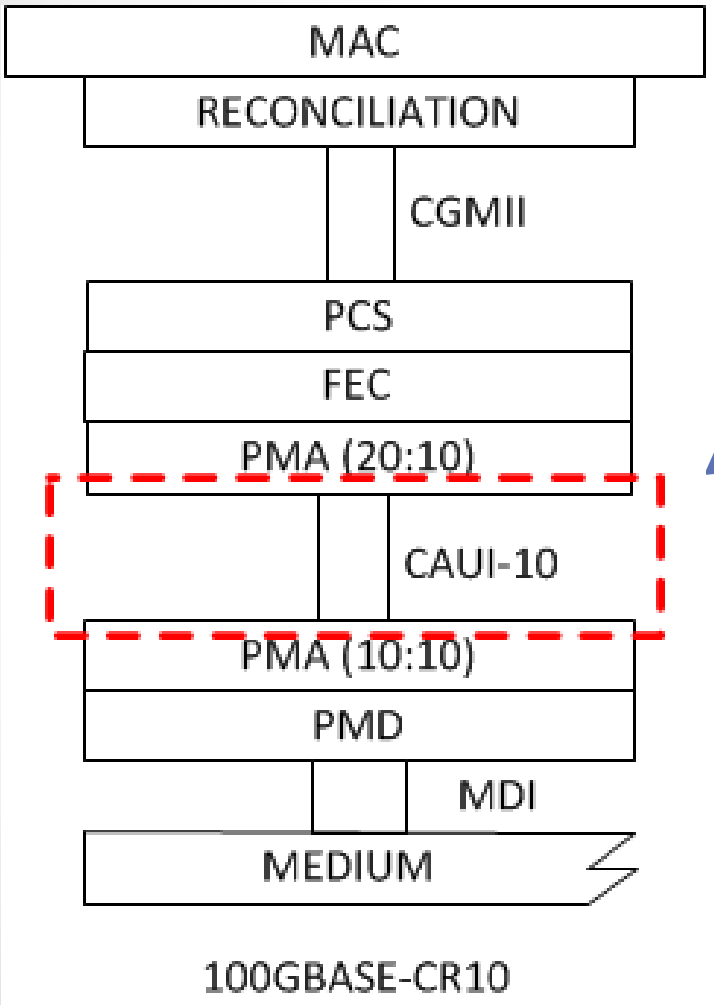
- XGMII Extender contains XAUI
- 8B / 10B encoding / decoding
- Clock / data recovery in XGXS

- XGXS encoding does not match 10 GBASE-R (64b/66b) PCS
- Added complexity
- Limited flexibility

Multiple PCS's possible

- Clauses 48 (8B/10B), 49 (64B/66B), 55 (twisted pair PCS)

802.3ba 40 / 100 GbE Architecture



CAUI-10

- No extender sublayer
- No additional encoding
- Can move between sub-layers in PHY

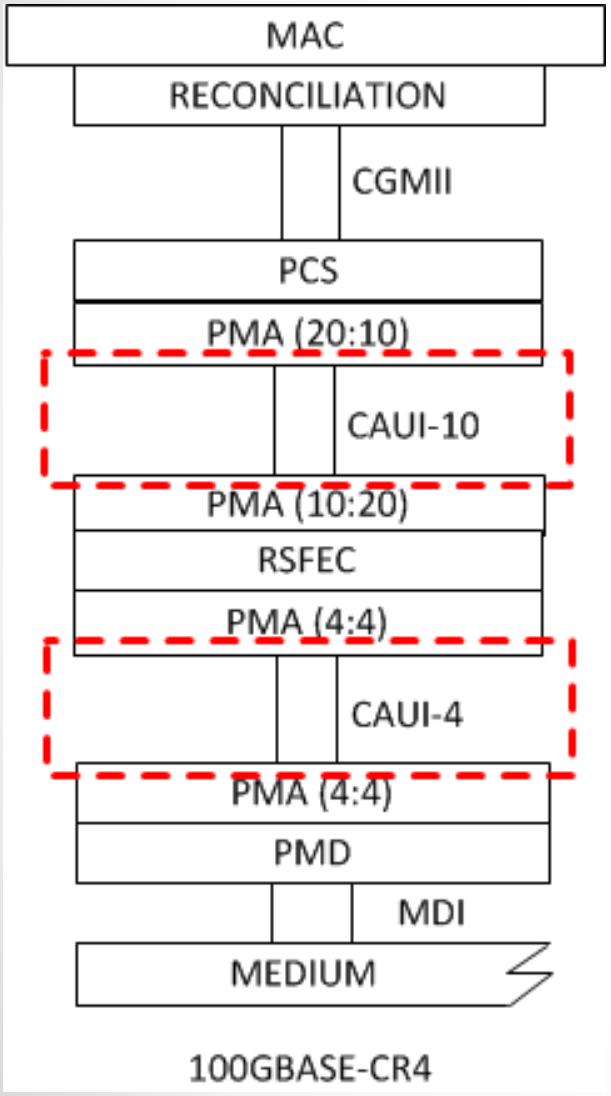
- Increased flexibility
- Reduced complexity

- Not above PCS!

802.3ba Architecture Legacy

100GBASE-CR4 and 40GBASE-T Development Efforts

100GBASE-CR4 Architecture



CAUI-10

- No extender sublayer
- No additional encoding
- Can only be between PCS and top FEC

RSFEC

- Transcoding
- FEC encoding
- 4 lanes

CAUI-4

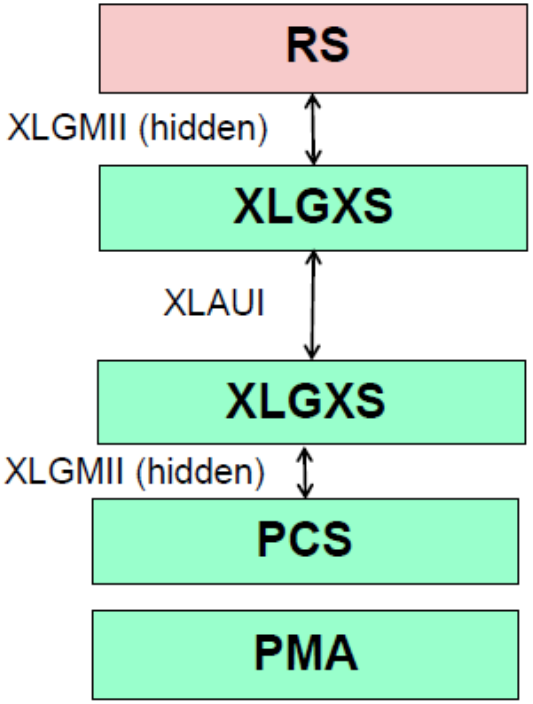
- No extender sublayer
- No additional encoding
- Can be between any sub-layers in PHY

- Added complexity / rules

Implications on 40GBASE-T (1 of 3)

40GBASE-T solution

Option #1 – old school approach



Define extender sublayer – based on existing PCS

Possibly use PMA for XLAUI

Allows unrestricted EEE choices & Fast Retrain

Problems with use of existing devices above XLAUI

BASE-T structure similar to 10G

Probably not acceptable for existing BASE-R community

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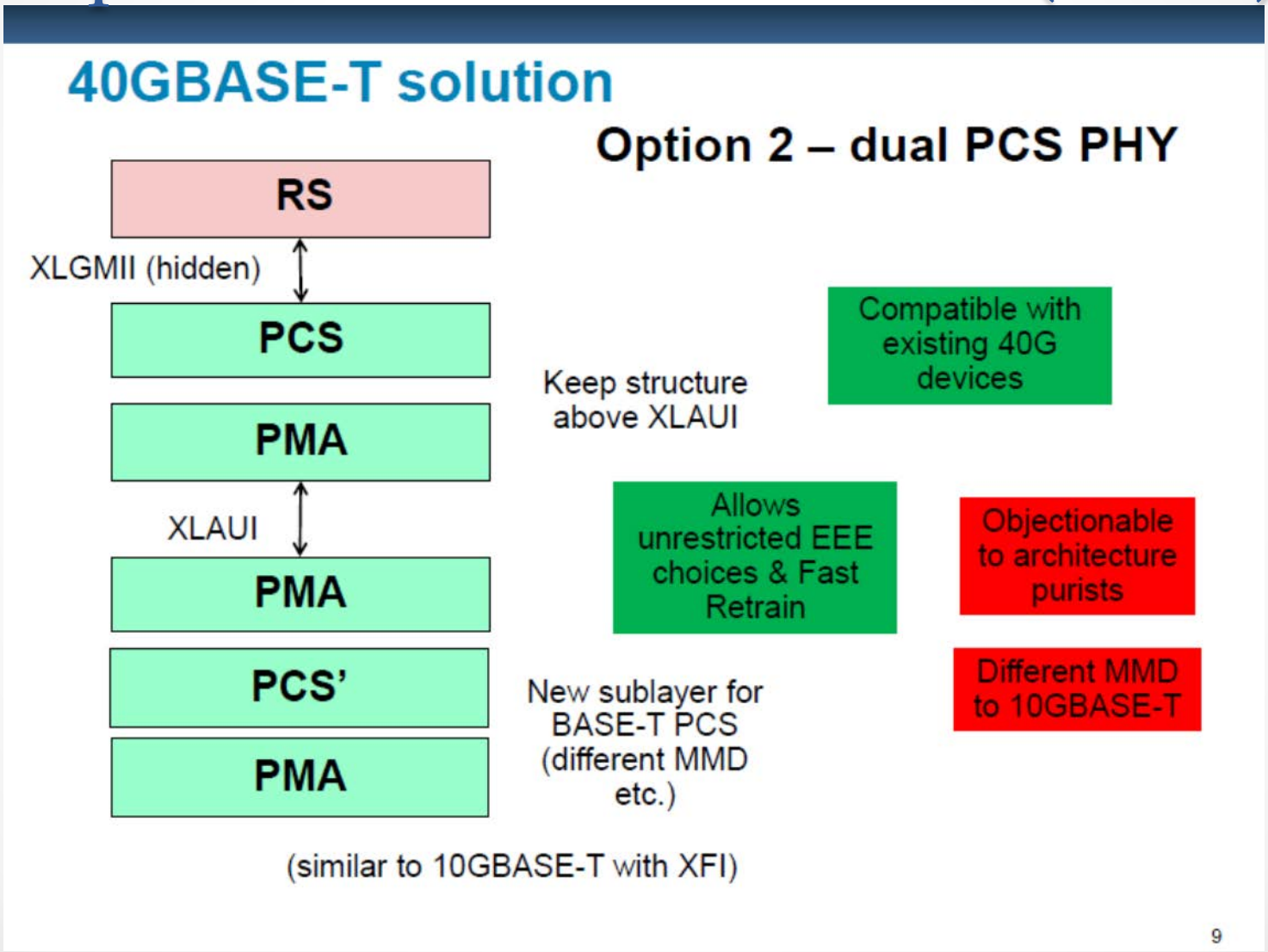
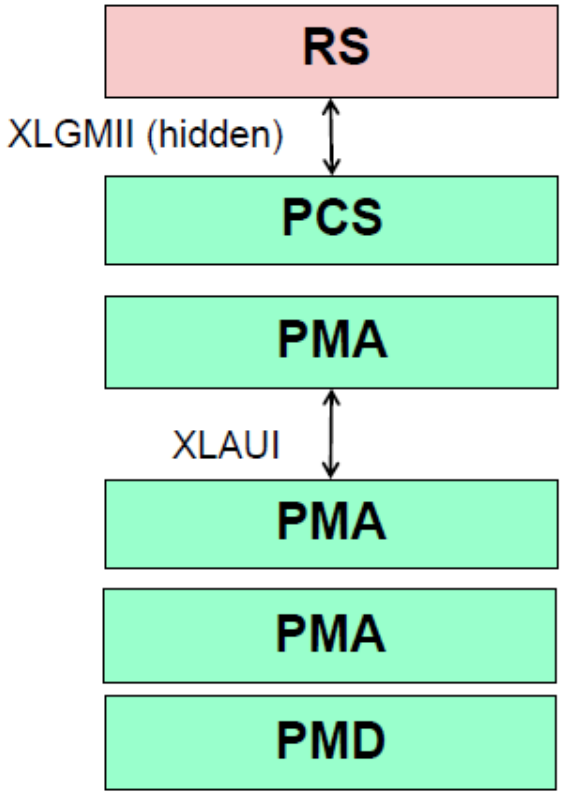
Implications on 40GBASE-T (2 of 3)



Implications on 40GBASE-T (3 of 3)

40GBASE-T solution

Option 3 – BASE-T PMA/PMD



Keep structure of 40GBASE-R

Compatible with 40G architecture

Approach similar to 100G copper

EEE behavior governed by PCS

Fast Retrain would require Clause 82 edits

Define transcoding & FEC in PMA (& FEC sublayer if necessary)

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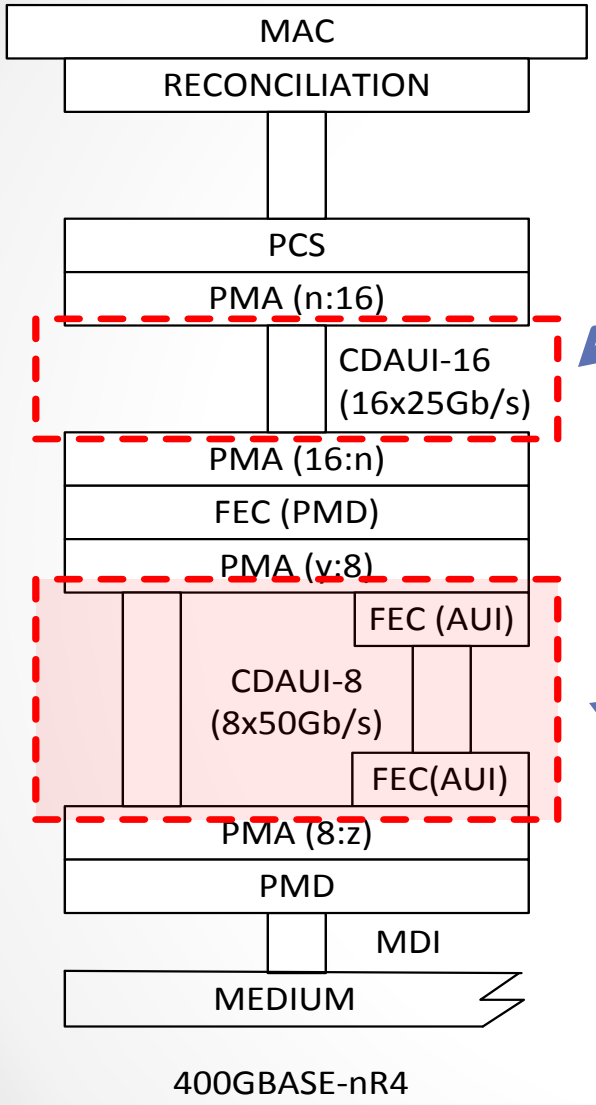
Source: barrass_3bq_01_0713.pdf

400GbE Architecture Discussions

Discussion Related to FEC



400GBASE-nR4

CDAUI-16

- No extender sublayer
- No additional encoding
- Is FEC needed to meet interface channel requirements?
- Placement may be limited by FEC (PMD)

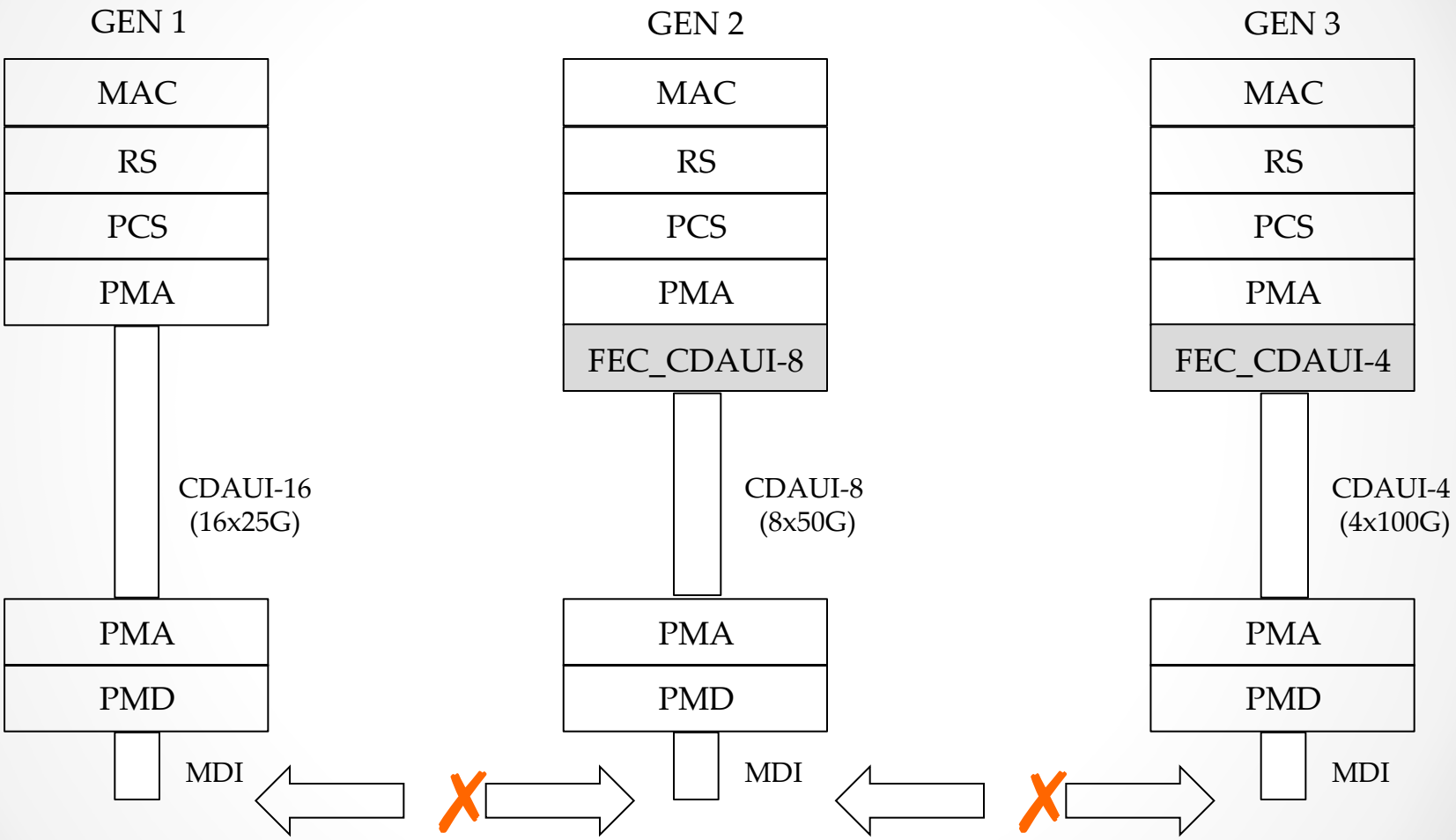
FEC (PMD)

- TBD

CDAUI-8

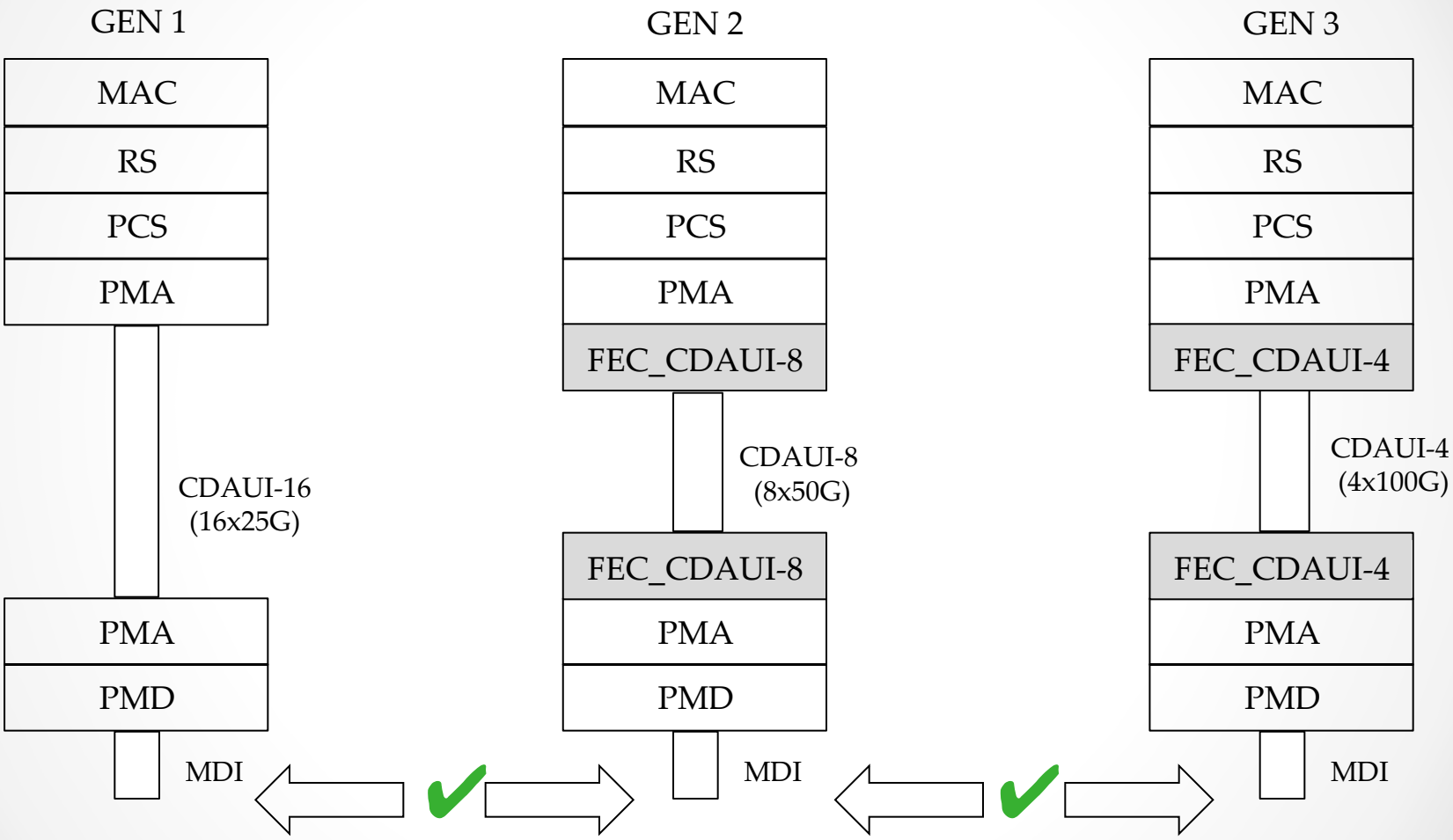
- Will FEC(AUI) be needed for this interface channel requirement?
- Do we need to reconsider an extender sub-layer concept?

CDAUI Generational Interop – The Problem



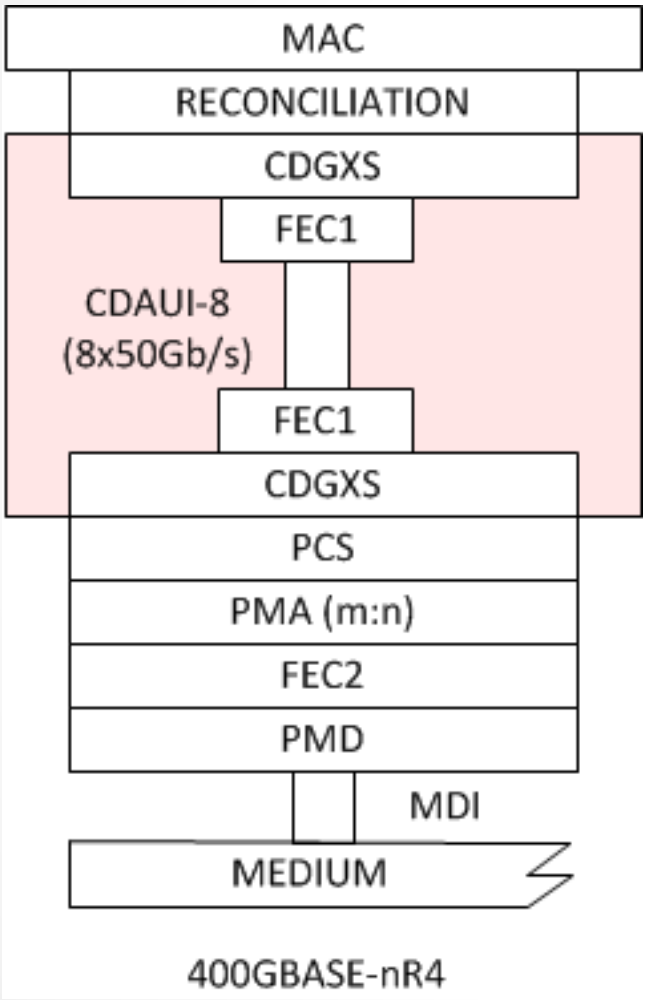
- Single PMD Type, three different generations of CDAUI (-16,-8 and -4)
- No Interop between different generations.
- Cannot simply add CDAUI FEC as a single layer into the stack !!

CDAUI Generational Interop – The Solution



- FEC/Coding for CDAUI must be localized (and not go out on the MDI)
- Full Interop between different generations !!

An Extender Sublayer above the PCS?



- Will we need multiple PCS?
  - WHO KNOWS?
- CDGXS may include
  - Encoding
  - FEC
  - CDAUI-n electrical specifications
  - Alignment markers?
- Would the FEC in CDGXS be the same FEC for the PMD?
  - Can we assume this?
  - Do we need independence?

- While part of the physical layer specification (not PHY), we suggest specific objective
  - Could be different than CAUI
  - We might define an optional physical instantiation above the PCS since XGMII / XAUI.

Summary

- **Various Issues for Discussion**
  - **The CDAUI and its definition?**
  - **A potential extender sub-layer?**
  - **FEC relationships between CDAUI and PMD?**
  - **Potential applications?**
  - **Interoperability between inter-generation implementations?**
  - **Required FEC for future optional physical instantiations?**
  - **Support for multiple PCS's?**

- **Recommend adding objective –**
  - **Support optional CDAUI for chip-to-chip and chip-to-module applications**